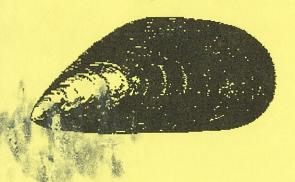
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NATIONAL STATUS & TRENDS PROGRAM

for Marine Environmental Quality

Progress Report



A Summary of Selected Data on Chemical Contaminants in Tissues Collected During 1984, 1985, and 1986

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National Ocean Service Office of Oceanography and Marine Assessment

NOAA Technical Memorandum NOS OMA 38

A SUMMARY OF SELECTED DATA ON CHEMICAL CONTAMINANTS IN TISSUES COLLECTED DURING 1984, 1985, AND 1986

Rockville, Maryland December 1987



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DEPARTMENT OF COMMERCE
C. William Verity, Jr.
Secretary

National Oceanic and Atmospheric Administration J. Curtis Mack, II Assistant Secretary and Deputy Administrator National Ocean Service Paul M. Wolff Assistant Administrator for Ocean Services and Coastal Zone Management Several organizations are responsible for the data in this report and for that reason no particular individuals are listed as authors. The organizations are:

Ocean Assessments Division Office of Oceanography and Marine Assessment National Ocean Service National Oceanic and Atmospheric Administration U.S. Department of Commerce Rockville, Maryland

National Oceanic and Atmospheric Administration National Marine Fisheries Service

Northeast Fisheries Center Gloucester Laboratory Sandy Hook Laboratory Oxford Laboratory

Southeast Fisheries Center Beaufort Laboratory **Charleston Laboratory**

Northwest and Alaska Fisheries Center **Environmental Conservation Division**

Battelle Ocean Sciences

Science Applications International Corporation

Texas A&M Research Foundation Geochemical and Environmental Research Group

Correspondence relative to this report should be addressed to:

Dr. Thomas P. O'Connor, Manager National Status and Trends Program Ocean Assessments Division Office of Oceanography and Marine Assessment National Oceanic and Atmospheric Administration 11400 Rockville Pike Rockville, MD 20852

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ABSTRACT.

The most contaminated sites in the nationwide grid of the National Status and Trends Program have been identified on the basis of rankings of contaminant concentrations in bivalves at 145 Mussel Watch Project sites and in livers from fish at 43 Benthic Surveillance Project sites. The chemicals used on this national scale to define contamination were total PAHs, total PCBs, total DDT, total (non-DDT) chlorinated pesticides, and the elements, arsenic, cadmium, chromium, lead, mercury, nickel, silver and tin. The elements copper and zinc could not be used because their concentrations in bivalve tissue were so obviously determined by the species of bivalve. Selenium was not used because its concentration in bivalves varied over a very small range. Concentrations of antimony and thallium in bivalves and fish livers were so often below detectable levels that they could not be used on a national scale to define contamination. To a large extent the sites found to be among the ten percent most contaminated sites were near large coastal cities. However, there are sites near these large cities that are not among the most contaminated and there are sites in apparently remote locations that are highly contaminated. Understanding both of those kinds of observations will require detailed analysis of the local situations. Differences in organic contaminant concentrations found in fish livers in 1984 and 1985 were generally small and indicate little short term temporal variability in contamination.

INTRODUCTION

Decisions on the use and allocation of resources in the nation's coastal and estuarine regions require reliable and continuous information on the status and trends of environmental quality in those areas. Beginning in 1984 the Ocean Assessments Division (OAD) undertook the task of providing this information through its National Status and Trends (NS&T) Program for Marine Environmental Quality. The program's objectives include defining the geographic distribution of contaminant concentrations in biological tissues and in sediments, determining temporal changes in those concentrations, and documenting biological responses to contamination. Samples have been collected since 1984 at about fifty Benthic Surveillance sites and since 1986 at about 150 Mussel Watch sites. Sediment samples are collected at all sites. At Benthic Surveillance sites benthic fishes are collected and their livers excised and stored for subsequent chemical analysis. At Mussel Watch sites bivalve molluscs are collected for

analysis. The first NS&T report (NOAA, 1987), based on data from analyses of sediments and fish livers collected in 1984, was issued in January 1987.

This report includes an analysis of 1984 Benthic Surveillance tissue data already discussed in that earlier report as well as some data from 1985, and of Mussel Watch tissue data from 1986. Data from sediments collected in conjunction with these tissue samples will be presented in a subsequent report. This report stresses the relative rankings among sites of contaminant concentrations and consolidates rankings based on bivalve data with those derived from analyses of fish livers.

It is expected that information from the NS&T Program will provide a basis for setting priorities for management action and for documenting changes that may occur because of such actions. It is the intention of the program to quantify general areas in terms of contamination levels and it is important to note that sites selected for sampling are deliberately not near point sources of contamination. Management action on any individual point source will not be recognized in the NS&T data unless that source exerts a strong influence on environmental quality over a relatively large area. On the other hand, the NS&T program will identify the combined influence of many point and non-point sources of contamination to an area.

SITE LOCATIONS

The sites sampled by the Benthic Surveillance Project in 1984 and 1985 and by the Mussel Watch Project in 1986 are named and shown on the series of maps that comprise Appendix A. Each site is designated by the name of its general location. The Mussel Watch sites, because there is often more than one site in a general area, also have a more specific designation. All sites are assigned a code — four letters for Mussel Watch and three for Benthic Surveillance. The codes used throughout this report are intended to remain constant from year to year as the NS&T Program evolves.

FIELD AND ANALYTICAL METHODS

A detailed listing of sampling and analytical protocols has been prepared (Shigenaka and Lauenstein, 1987) so those aspects of the program will be discussed here only briefly.

For the Mussel Watch Project, mussels were taken along the West Coast and the East Coast (north of Delaware Bay) and oysters were collected at Gulf Coast sites, at the remaining East Coast (Delaware Bay and south) sites, and at the two sites in Hawaii. Two species of mussels and two species of oysters were collected (the species at each site are listed in Appendix D). Bivalves were not shucked in the field. They were separated when found to be adhering to one another and scrubbed with a nylon or natural fiber brush to remove adhering detritus. Cleaned samples were then packed in dry ice and shipped back to the laboratory. Six separate composites of whole tissue samples from each site were subsequently analyzed for contaminant concentrations — three composites for organic analyses and three for elemental

analysis. Each mussel composite consisted of 30 individuals and each oyster composite contained 20 individuals. The exception to this sequence were the bivalves used to identify the gonadal state of the sampled populations. They were shucked and preserved immediately after collection.

Trawls for target species of bottom fish (listed in Appendix E) were conducted at Benthic Surveillance sites. The livers were excised aboard ship and frozen at -80°C until analyzed. For the organic analyses of liver samples collected along the Pacific and northeast Atlantic coasts, three composites of ten livers each were prepared. Because target fish were smaller on the southeast Atlantic and Gulf coasts, individual composites for organic analysis contained between ten to twenty livers. For elemental analyses in fish liver, measurements were performed on ten individual livers from the East and Gulf coast sites and on three from each West coast site.

Trace metals and polyaromatic hydrocarbon compounds measured in the NS&T Program are listed in Table 1. Table 2 is the listing of DDT, its metabolites, and other chlorinated pesticides analyzed in the program. Polychlorinated biphenyls (PCBs) are also measured, with results reported as concentrations at each of eight levels of chlorination from di- to nonachlorobiphenyls. The methods used for the analysis of organic chemicals in sediment and tissue are described in a technical report prepared by NOAA's National Analytical Facility (MacLeod et al., 1985 and subsequent revisions). Analytical methods used for the analysis of trace metals and iron in fish liver tissue are described in an unpublished manual developed by NOAA's National Marine Fisheries Service (NMFS). Elemental analysis of tissues was preceded by digestion in concentrated nitric acid while sediments were digested in concentrated hydrofluoric acid. In addition to analyses for contaminants some ancillary parameters were quantified. Grain size and total organic carbon analyses of sediment were made in recognition that these parameters would influence contaminant concentrations. The lipid content of bivalves was measured because it may account for some of the variability in contaminant concentrations.

Quality assurance (QA) protocols are an integral part of the NS&T Program. QA efforts are designed to produce nationally uniform analytical results of known and accepted quality, thereby ensuring comparability among data sets. Attainment of this goal involves five major activities:

- Development and use of standardized field sampling procedures and analytical protocols;
- · Conduct of interlaboratory comparisons of analytical methods;
- Conduct of periodic quality assurance workshops;
- Development of Standard Reference Materials (SRMs) and Interim Reference Materials (IRMs) for marine sediments and tissues;
- Development and use of a standardized data base for QA data and information.

Table 1. Major and trace elements and polyaromatic hydrocarbons analyzed in the National Status and Trends Program.

Symbol	Major Elements	Element
Al Fe Mn Si	Major Elements	Aluminum Iron Manganese Silicon
	Minor Elements	
Sb		Antimony
As		Arsenic
Cd		Cadmium
Cr		Chromium
Cu	`.	Copper
Pb.		Lead
Hg -		Mercury
Ni		Nickel
Se		Selenium
Ag		Silver
TI	•	Thallium
Sn ·		Tin
Zn		Zinc

Aromatic Hydrocarbon	CAS Number ^a	Alternate Name
Acenaphthene Anthracene Benz[a]anthracene Benzo[a]pyrene Benzo[e]pyrene Biphenyl	83-32-9 120-12-7 56-55-3 50-32-8 192-97-2	1,2-dihydroacenaphthalene Paranaphthalene 1,2-benzanthracene 3,4-benzpyrene 1,2-benzpyrene
Chrysene Dibenzanthracene 2,6-Dimethylnaphthalene	92-52-4 218-01-9 53-70-3 581-42-0	Diphenyl; phenylbenzene 1,2-benzphenanthrene Dibenz[<i>a,h</i>]anthracene —
Fluoranthene Fluorene 1-Methylnaphthalene 2-Methylnaphthalene	206-44-0 86-73-7 90-12-0 91-57-6	1,2-(1,8-naphthalene)benzene o-biphenylenemethane —
1-Methylphenanthrene Naphthalene Perylene Phenanthrene Pyrene	832-69-9 91-20-3 198-55-0 85-01-8 129-00-0	Dibenz[<i>de,kl</i>]anthracene Benzo[<i>def</i>]phenanthrene

^aChemical Abstracting Service Registration Number

Table 2. Organic compounds (pesticides) analyzed in the National Status and Trends Program.

Chlorinated Pesticide	CAS Number	Alternate Name
Aldrin	309-00-2	1,2,3,4,10,10-hexachloro- 1,4,4a,5,8,8a-hexahydro- 1,4;5,8-dimethanonaphthalene
alpha-Chlordane	5103-71-9	1,2,4,5,6,7,8,8-octachloro- 2,3,3a,4,7,7a-hexahydro- 4,7-methano-1 <i>h</i> - indene
<i>o,p'</i> - DDD	53-19-0	1-chloro-2-[2,2-dichloro- 1-(4-chlorophenyl)ethyl]- benzene
<i>p,p'-</i> DDD	72-54-8	1,1-dichloro-2,2-bis (p- chlorophenyl)ethane
<i>o,p'-</i> DDE	3424-82-6	1-chloro-2-[2,2-dichloro- 1-(4-chlorophenyl)ethyl] benzene
p,p'- DDE	72-55-9	1,1'-(dichloroethenylidene)- bis (4-chloro-benzene)
<i>o,p'</i> - DDT	789-02-6	1-chloro-2-[2,2,2-trichloro- 1-(4-chlorophenyl)ethyl] benzene
<i>p,p'-</i> DDT	50-29-3	1,1'-(2,2,2-trichloro- ethylidene)bis[4-chloro- benzene]
Dieldrin	60-57-1	3,4,5,6,9,9-hexachloro- 1a,2,2a,3,6,6a,7,7a-octahydro- 2,7:3,6-dimethanonaphth- [2,3-b]-oxirene dimethanonaphthalene
Heptachlor	76-44-8	1,4,5,6,7,8,8-heptachloro- 3a,4,7,7a-tetrahydro-4,7- methanoindene
Heptachlor epoxide	1024-57-4	1,4,5,6,7,8,8-heptachloro 2,3-epoxy-3a,4,7,7a-tetra- hydro-4,7-methanoindane
Hexachlorobenzene	118-74-1	
Lindane (gamma-BHC) Mirex	58-89-9 2385-85-5	gamma-hexachlorocyclohexane 1,1a,2,2,3,3a,4,5,5a,5b,6-dodecachlorooctahydro-1,3,4-metheno-1 <i>h</i> -cyclobuta-[<i>c,d</i>]-pentalene
trans- Nonachlor	39765-80-5	(1,2,3,4,5,6,7,8,8-nonachloro- 2,3,3a,4,7,7a-hexahydro-4,7- methano-1 <i>h</i> -indene

^aChemical Abstracting Service Registration Number

CONTAMINANTS IN BIVALVES

During 1986, bivalves from 145 sites were collected and analyzed in the NOAA Mussel Watch Project. The mean concentrations derived from these data are summarized in a series of 19 figures (Appendix B) and tabulated in Appendix D. Contaminants under consideration are all the trace elements in the data set: antimony, arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, tin, and zinc. For organic contaminants, individual polyaromatic hydrocarbons have been combined to create a single analytical result in terms of total polyaromatic hydrocarbons (tPAH). Similarly, the individual PCB data have been combined to a tPCB value; individual data on DDT and its metabolite compounds have been combined to a total value called tDDT; and the non-DDT chlorinated pesticide data have been combined into a single value, tChIP.

It is primarily on the basis of rankings that the data will be used to identify the distribution of contamination in the coastal United States. The figures in Appendix B show mean contaminant concentration data in order from high to low concentration. While rankings will be used, it is important to recognize each contaminant mean is the result of averaging three values that often vary considerably from one another. This within-site variability is due to natural differences among bivalves and to imprecision of chemical analyses. Because of that variability, two sites which rank differently may not actually contain bivalves with different concentrations of contamination.

Variability is quantified in this report in two ways. First, the coefficient of variation of each concentration mean is listed with its mean in Appendix D. Individual coefficients of variation are averaged to yield the "overall coefficient of variation" which is shown in the body of each figure in Appendix B. With that number, it is possible to see the relative variation or "noisiness" of each contaminant, e.g. the tDDT data have an overall coefficient of variation of 41%, and these data are much noisier than that of, say, cadmium where the overall coefficient of variation is only 14%. Second, through a manipulation involving logarithmic transformations of the data (see footnote b, Table 3) it is possible to calculate a ratio that must exist between two means in order to be 90% confident that the bivalves at two sites do differ in contamination concentration. That ratio required to detect differences is shown in the figures and varies from a "noisy" 6.7 for tPAH data to 1.15 for the very stable arsenic data. Regardless of rankings it should be understood that, for example, two means for tPAH must differ by at least a factor of 6.7 for their sites to be considered different in terms of tPAH contamination.

Table 3 contains these measures of variability and begins the analysis of contaminant levels in bivalves. Also listed are the data on the occurrence of detectable amounts of the contaminant and on the range of concentrations spanned by the contaminant over the 145 Mussel Watch sites. Those ranges are shown as ratios calculated using the fifth highest and fifth lowest means in order to avoid bias by one or two extremely high or low values.

Table 3. Variability in chemical concentrations found in bivalves and ranges defined by ratios of high to low concentrations

or mgm to love t	JOHOOH III GIIOTTI	,			
				Range	
	No. Sites at	overali a	ratio to b	ratio of 5th highest	
<u>Chemical</u>	which found	<u>c.v.%</u>	<u>detect diff.</u>	to 5th lowest	
tDDT	145	41	2.14	81	
tChIP	145	38	2.02	37	
tPAH	134	58	6.71	505	
tPCB	145	37	1.84	80	
Antimony	30	55	8.10	7.8	
Arsenic	145	11	1.15	5.9	
Cadmium	145	14	1.22	12	
Chromium	145	24	1.42	21	
Copper/oyster	73	16	1.29	8.2	
Copper/musse	el 72	8	1.12	2.3	
Lead	145	22	1.50	60	
Mercury	145	21	1.33	11	
Nickel	145	17	1.26	8.6	
Selenium	145	15	1.22	4.0	
Silver	144	23	1.54	517	
Thallium	21	21	1.86	2.0	
Tin	77	39	2.27	37	
Zinc/oyster	73	16	1.25	9.7	
Zinc/mussel	72	9	1.13	3.0	

aThe overall c.v.% is the mean of all the individual site coefficients of variation (c.v.%) for a given chemical, excluding sites with fewer than three individual analyses and sites where two of three analyses yielded no detectable concentration (see Appendix A).

bThe ratio required to detect a difference is the ratio required between any two mean concentrations in order to be 90% confident that the means represent sites that are really different in terms of bivalve concentrations for that contaminant. This has been calculated by first converting all data to logarithmic values, then calculating geometric means for each site, then using the overall geometric coefficient of variation to calculate the variance for each site. Finally those variances were used in an ANOVA calculation of Least Significant Difference (Snedecor and Cochran, 1967) using the t-value corresponding to a 90% level of confidence. Strictly speaking, the ratios refer to geometric rather than arithmetic means. As data accumulates, the methods of summarizing it will change. At this point the methods are not of critical importance because only rankings of data are being used.

Results of analysis thus far require culling some chemicals from the list to be used to identify contaminant distributions on a national scale. Selenium has been eliminated from consideration because its small range of concentrations over a national scale allows little opportunity for defining differences among sites. Arsenic and nickel could have been eliminated on this same basis but, and this is a subjective point, their concentration ranges exceed a factor of five and that was deemed sufficient to keep them in consideration. Antimony and thallium were so rarely detected that they cannot be used as national indicators of contamination. Tin concentrations were detected at more than half the sites and will be used in this report. However, the fact that no tin was detected in any bivalves collected in California is an artifact of the high detection limit (approximately 1 µg/g dry) of the laboratory that analyzed those samples. Tin was detected at other locations though only in one case was its average concentration found to exceed 1µg/g. Copper and zinc have been eliminated from consideration because in each case the ranked data sort themselves by species regardless of site. Concentrations of both copper and zinc ranked higher at all 73 sites at which oysters were collected than at all 72 sites where mussels were analyzed. That species bias makes it impossible to use bivalve data on copper or zinc to define a national distribution of contamination.

While its existence with copper and zinc is immediately obvious, the problem of species dependence of contaminant concentrations may not be limited to those two elements. The highest 39 silver concentrations were all found among oysters and only three mussel sites ranked among the first 50 in silver concentration. Mussels, on the other hand, may have a particular affinity for lead and chromium. While the third highest mean chromium concentration was found at an oyster site, only four oyster sites ranked among the first fifty. Only five oyster sites ranked among the first fifty in lead concentration. Nevertheless, while future analysis may prove it to be invalid, silver, chromium, and lead concentrations will be compared among all bivalves and interpreted to indicate extents of site contamination.

So, the mean concentrations of twelve chemicals in bivalves at 145 sites throughout the country will be used to define the national distribution of contamination. The twelve chemicals are: tChIP, tDDT, tPAH, tPCB, arsenic, cadmium, chromium, lead, mercury, nickel, silver, and tin. Any analysis based on rankings is best done with the highest ranked concentrations because differences among them are larger than they are among lower ranked concentrations. Furthermore, from a national perspective, most interest lies in finding the most contaminated sites. So, this analysis emphasizes the upper ten percent of each ranking of 145 mean concentrations (i.e., the fifteen highest concentrations) and uses concentrations of twelve chemicals to define the most contaminated sites.

Tables 4, 5 and 6 result from scanning the rankings to find sites that lie among the upper 15 in concentrations of contaminants. Twenty sites are represented by two chemicals, ten sites by three chemicals, four by four, three by five, three by six, and one site is represented among the upper ten percent of the sites by ten chemicals (Table 4). Fifty sites have one chemical concentration among the upper ten percent (Table 5) and 54 sites are not among the top fifteen sites for any of the twelve contaminants (Table 6).

Table 4. Sites with 10,6,5,4,3,and 2 mean contaminant concentrations among the upper 10 percent of concentrations found in bivalves on a national scale.(Rankings are those among 145 sites)

0	Olic	
General Location Hud/Rar Estuary NY	ific Site <u>Code</u> HRUB	Contaminant (ranking) tChIP(8) tDDT(12) tPAH (2) tPCB(4) Cd(5) Cr(1) Pb(3) Hg(2) Ni(9) Sn(1)
Boston Harbor MA Long Island Snd NY Hud/Rar Estuary NY	BHDI LITN HRLB	tChIP(6) tPAH (9) tPCB(12) Pb(6) Hg(5) Sn(7) tChIP(10) tDDT(10) tPAH(7) tPCB(11) Pb(7)Sn(10) tChIP(1) tDDT(1) tPAH(12) tPCB(2) Hg(10)Sn(3)
Boston Harbor MA Hud/Rar Estuary NY New York Bight NJ	BHDB HRJB NYSH	tPAH(5) tPCB(8) Cr(15) Pb(4) Sn(6) tChIP(14) tDDT(15) tPAH(14) tPCB(15)Sn(15) tChIP(4) tDDT(7) PCB(7) Pb(9) Sn(5)
Boston Harbor MA Buzzards Bay MA Chesapeake Bay MD San Francisco Bay CA	BHHB BBAR CBMP SFDB	tPAH(6) tPCB(14) Cr(12) Pb(5) tChIP(7) tDDT(8) tPCB(1) Pb(15) Cd(3) Ni(3) Ag(3) Sn(9) tChIP(3) tDDT(5) Cd(12) Hg(12)
New York Bight NJ Delaware Bay DE Delaware Bay DE Naples Bay FL Choctawhatchee B.FL San Diego Bay CA Tomales Bay CA Bellingham Bay WA Barber's Point HI Honolulu Harbor HI	NYSR DBBD DBKI NBNB CBSP SDHI TBSR BBSM BPBP HHKL	tChIP(2) tPCB(3) Sn(12) Cd(8) Ni(10) Ag(13) Cd (4) Ni(11) Ag(4) tChIP(11) As(9) Sn(2) tDDT(6) Hg(15) Ag(12) tPAH(8) tPCB(5) Cd(15) Cr(8) Hg(9) Ni(2) Cr(4) Hg(8) Ni(8) tPAH(4) Pb(13) Hg(3) Hg(11) As(9) Ag(2)
Long Island Sound CT Long Island Sound NY Delaware Bay DE Delaware Bay DE Chesapeake Bay MD Charleston Harbor SC Charleston Harbor S St. Andrew Bay FL Mississippi Sound MS Vermillion Bay LA Galveston Bay TX Matagorda Bay TX Espiritu Santo TX Copano Bay TX Anaheim Bay CA Marina Del Ray CA San Simeon Point CA San Francisco Bay CA Point St. George CA Elliott Bay WA	LIMR DBFE DBAP CBHP CHFJ CHSF SAWB MSBB VBSP GBYC MBEM ESSP CBCR ABWJ MDSJ SSSS	Cr(9) Ni(12) Pb(14) tChIP(15) Ni(13) Ag(14) Cd(2) Ni(7) Ni(5) Ag(8) As(4) Ag(15) As(5) Sn(11) tDDT(11) tPAH(3) tChIP(9) Sn(14) Cd(10) Ag(7) tChIP(5) tPCB(6) Cd(11) Ag(11) Cd(13) Ag(6) Cd(1) Ag(1) tDDT(4) Pb(2) Cr(6) Pb(1) Cr(10) Ni(6) tChIP(13)Hg(13) Cr(7) Ni(4) tPAH(1) tPCB(13)

Table 5. Sites at which a single contaminant concentration is among the upper 10 percent of concentrations found in bivalves on a national scale. (Rankings are those among 145 sites)

Specific Site			
General Location	<u>Code</u>	Contaminant(ranking)	
Penobscot Bay ME	PBSI	Hg(14)	
Buzzards Bay MA	BBRH	tPCB(10)	
Buzzards Bay MA	BBGN	tPCB(9)	
Narragansett Bay RI	NBDI	Pb(8)	
Long Island Sound CT	LINH	tChIP(12)	
Long Island Sound CT	LIHR	Cr(2)	
Long Island Sound NY	LIHU	tPAH(13)	
Moriches Bay NY	MBTH	Hg(6)	
New York Bight NJ	NYLB	Sn(13)	
Chesapeake Bay VA	CBCC	tDDT(13)	
Quinby Inlet VA	QUIB	Ag(9)	
Cape Fear NC	CFBI	As(1)	
Savannah River Est. GA	SRTI	As(8)	
Sapelo Sound GA St. Johns River FL	SSSI SJCB	As(7)	
Rookery Bay FL	RBHC	Sn(8)	
Charlotte Harbor FL	CBBI	As(6) As(3)	
Tampa Bay FL	TBMK	As(13)	
Tampa Bay FL	TBPB	Hg(1)	
Cedar Key FL	CKBP	As(2)	
Mississippi Sound MS	MSPC	Cd(7)	
J. Harbor Bayou LA	JHJH	Sn(4)	
Matagorda Bay TX	MBGP	Hg(4)	
Matagorda Bay TX	MBLR	Ni(1)	
San Antonio Bay TX	SAMP	Ag(5)	
San Antonio Bay TX	SAPP	Cr(3)	
Aransas Bay TX	ABLR	Ag(10)	
Corpus Christi TX	CCNB	Cd(6)	
Lower Laguna Madre TX	LMSB	As(11)	
Imperial Beach CA	IBIB	tDDT(9)	
Point Loma CA	PLLH	As(12)	
La Jolla CA	LJLJ	Pb(11)	
Newport Beach CA	NBBC	Pb(12)	
San Pedro Harbor CA	SPFP	tDDT (2)	
Palos Verdes CA	PVRP	tDDT(3)	
Santa Cruz Island CA	SCFP	As(15)	
Pt. Dume CA	PDPD	Cr(14)	
Point Conception CA	PCPC	As(14)	
San Luis Obispo Bay CA	SLSL	tDDT(14)	
Pacific Grove CA	PGLP	Pb(10)	
Arena CA Pt. Delgada CA	PAPA	Ni (14)	
Humboldt Bay CA	PDSC HMBJ	Cd(9) Cr(5)	
Coos Bay OR	CBCH	tPAH(15)	
Coos Bay OR	CBRP	tPAH(10)	
Yaquina Bay OR	YBOP	tPAH(11)	
Yaquina Head OR	YHYH	Ni(15)	
Str. of Juan de Fuca WA	JFCF	Cd(14)	
Whidbey Island WA	WIPP	Cr(11)	
Port Valdez AK	PVMC	Cr(13)	
** *	=	` '	

Table 6. Sites at which no contaminant concentration was among the upper 15 of 145 concentrations on a national scale.

General Location	Specific Site Code	S General Location	pecific Site <u>Code</u>
Penobscot Bay ME	PBPI	Terrebonne Bay LA	TBLF
Boston Harbor MA	BHBI	Terrebonne Bay LA	TBLB
Narragansett Bay RI	NBCI	Caillou Lake LA	CLCL
Long Island Sound CT	LISI	Atchafalaya Bay LA	ABOB
Long Island Sound NY	LIHH	Calcasieu Lake LA	CLSJ
Long Island Sound NY	LIPJ	Sabine Lake LA	SLBB
Chesapeake Bay MD	CBHG	Galveston Bay TX	GBHR
Chesapeake Bay VA	CBIB	Galveston Bay TX	GBTD
Chesapeake Bay VA	CBST	Galveston Bay TX	GBCR
Chincoteague Bay VA	CBCI	Matagorda Bay TX	MBTP
Roanoke Sound VA	RSJC	Mesquite Bay TX	MBAR
Pamlico Sound NC	PSWB	Corpus Christi TX	CCIC
Matanzas River FL	MRCB	Mission Bay CA	MBVB
Biscayne Bay FL	BBPC	Oceanside CA	OSBJ
Everglades FL	EVFU	Santa Catalina Island CA	SCBR
Tampa Bay FL	TBCB	Pt. Santa Barbara CA	SBSB
Tampa Bay FL	TBHB	Monterey Bay CA	MBSC
Apalachicola Bay FL	APCP	Bodega Bay CA	BBBE
Apalachicola Bay FL	APDB	Tillamook Bay OR	TBHP
Choctawhatchee Bay FL	CBSR	Columbia River OR	CRSJ
Pensacola Bay FL	PBIB	Gray's Harbor WA	GHWJ
Mobile Bay AL	MBCP	South Puget Sound WA	SSBI
Mississippi Sound MS	MSPB	Commencement Bay WA	
Lake Borgne LA	LBMP	Sinclair Inlet WA	SIWP
Breton Sound LA	BSSI	Point Roberts WA	PRPR
Breton Sound LA	BSBG	Unakwit Inlet AK	UISB
Baritaria Bay LA	BBSD		
Baritaria Bay LA	BBMB		

CONTAMINANTS IN FISH LIVERS.

Prior to discussing contaminant data it will be useful to incorporate data from analyses of fish livers. The data for fishes collected in 1984 are presented in a manner analagous to that used for bivalves; data are on figures (Appendix C) ranked in terms of concentration and listed in Appendix E. Table 7 summarizes the variability and range of the data. The data are not strictly comparable to the bivalve data because not only are they for fish rather than bivalves, but they are derived from eight different species of fish (see Appendix E). Furthermore, while all analyses of bivalve tissue are from composite samples, the metal analyses in fish livers are from individual livers (Ten individual livers for fish from the east and Gulf coasts; three individual livers per west coast site).

Despite the fact that metal data for fish livers are much more variable than for bivalves, they have been used for an analysis based on rankings like that done for the bivalve data. Except for tPAH, which is not measured in fish livers, the same contaminants used in the analysis of bivalve data have been applied to define the most contaminated sites (i.e., tChIP, tDDt, tPCB, As, Cd, Cr, Pb, Hg, Ni, Ag, and Sn). Since there were only 43 Benthic Surveillance sites in 1984, the upper ten percent has been defined by concentrations ranking in the upper five sites. Eighteen sites are not represented by any contaminant concentrations ranking among the first five, eight sites are represented by one contaminant, nine sites by two, seven sites by three, and one site has four contaminant concentrations listed among the upper five percent (Table 8).

THE MOST CONTAMINATED SITES AS DETERMINED FROM TISSUE DATA

Four criteria have been applied to the bivalve and fish liver data to determine what they define to be the most contaminated sites in the coastal United States:

- Any Mussel Watch site with three or more bivalve contaminant concentration among the upper fifteen concentrations or any Benthic Surveillance site with two or more fish liver contaminant concentrations among the upper five concentrations,
- 2. Any site Mussel Watch site with two concentrations among the upper ten concentrations or a Benthic Surveillance site with at least one concentrations among the upper three,
- 3. Any Mussel Watch site with one concentration among the upper five concentrations,
- 4. Any Mussel Watch site with at least one contaminant concentration among the upper fifteen and which is located within 20 km of a site which itself is declared contaminated for that chemical by any of the first three criteria.

Table 7. Variability in chemical concentrations found in fish livers collected in 1984 and ranges defined by ratios of high to low concentrations

			• • • • • • • • • • • • • • • • • • • •
	·		Range
•	No. Sites at	overall a	ratio of 5th highest
<u>Chemical</u>	which found	<u>c.v.%</u>	to 5th lowest
tChIP	40	40	11
tDDT	42	40	63
tPCB	40	32	10
Antimony	16	56	2.2
Arsenic	43	- 53	12
Cadmium	43	58	37
Chromium	43	84	18
Copper	43	51	7.3
Lead	42	75	17
Mercury	41	55	8.7
Nickel	41	67	7.9
Selenium	43	32	5.8
Silver	43	68	26
Thallium	10	71	-
Tin	41	97	· 6.1
Zinc	43	23	2.2

aThe overall c.v.% is the mean of all the individual site coefficients of variation (c.v.%) for a given chemical, excluding sites with fewer than three individual analyses and sites where two of three analyses yielded no detectable concentration (see Appendix B).

Table 8. Sites with 4,3,2, 1, and no mean contaminant concentrations among the upper 10 percent of concentrations found in fish livers on a national scale.(Rankings are those among 43 sites)

ŚĮ	pecific Site	-
General Location	<u>Code</u>	Contaminant(ranking)
Dana Point CA	DAN	tDDT(5) Cd(4) Hg(2) Ag(5)
Western L.I. Sound NY	WLI	Pb(4) Ni(1) Sn(3)
San Diego Harbor CA	SDA	tPCB(1) Ni(2) Hg(3)
Seal Beach CA	SEA	tChIP(5) tDDT(2) tPCB(4)
Southhampton Shoal CA	SHS	Cd(1) Hg(1) Ni(4)
Coos Bay OR	COO	As(1) Cr(1) Sn(1)
Nisqually Reach WA	NIS	Cd(2) Cr(5) Ni(3)
Elliott Bay WA	ELL	tPCB(3) Pb(2) Sn(2)
Oana Day ME		
Casco Bay ME	CSC	Pb(1) Ag(3)
Salem Harbor MA	SAL	tChIP(3) Cr(4)
Boston Harbor MA	BOS	tChIP(1) tPCB(2)
San Diego Bay CA	SDF	tDDT(4) Ni(5)
San Pedro Canyon CA	SPC	tDDT(1) tPCB(5)
Santa Monica Bay CA	SMB	tDDT(3) Ag(1)
Oakland Harbor CA	OAK	tChIP(4) Hg(4)
Hunters Point CA	HUN	tChIP(2) Cd(3)
Columbia River OR	COL	Cd(5) Cr(3)
Merrimack River MA	MER	Ag(4)
Buzzards Bay MA	BUZ	Pb(5)
Narragansett Bay RI	NAR	As(4)
Galveston Bay TX	GAL	Sn(5)
Corpus Christi Bay TX	CCB	Hg(5)
Commencement Bay WA	COM	Pb(3)
Nahku Bay AK	NAH	As(2)
Lutak Inlet AK	LUT	As(3)
		1.6(0)
E. Long Island Sound CT	ELI	
Delaware Bay DE	DEL	
L. Chesapeake Bay VA	LCB	
Pamlico Sound NC	PAM	
Charleston Harbor SC	CHS	
Sapelo Sound GA	SAP	
St. Johns River FL	STJ	
Charlotte Harbor FL	CHR	
Apalachicola Bay FL	APA	
Mobile Bay AL	MOB	
Round Island MS	ROU	
Heron Bay MS	HER	
Mississippi River Delta LA	MRD	
Barataria Bay LA	BAR	
San Antonio Bay TX	SAB	
Lower Laguna Madre TX	LLM	
San Pablo Bay CA	PAB	
Bodega Bay CA	BOD	

The criterion of at least three bivalve chemical concentrations being among the upper fifteen or at least two fish liver contaminant concentrations among the first five is based on the acknowledged imprecision in the mean concentrations. At the lower end of even the upper ranked concentrations there is sufficient variability to cause a single concentration to be not statistically different from a concentration that falls well below that upper level. For example, the thirteenth highest tPCB concentration of 1070 ng/g was found at site EBFR in Elliott Bay, WA. That value is not statistically different from any lower value which exceeds 580 ng/g and which would be only the 29th highest concentration. Therefore, a single chemical concentration at a site of at the lower end of an upper ranking is not considered sufficient to include that site among a list of most contaminated sites.

The second and third criteria cover situations where a site displays one or two very highly ranked contaminant concentrations. The fourth criterion allows inclusion of sites that, along with more contaminated sites, define a general area as contaminated. By themselves such sites would not be remarkable. The fact that, as part of a group, they display contamination over a larger scale is worth acknowledging in a list of most contaminated sites. The converse of this fourth criterion is a large dichotomy in contaminant levels among close-by sites. This latter situation applies when contamination is a very local occurrence and not a condition that generally characterizes an area.

The results of applying these criteria are shown in Tables 9,10, and 11 where the most contaminated sites are listed according to the coast. In general the contaminated sites are near large metropolitan areas.

One unexpected result of sorting the data is that the highest nine concentrations of arsenic in bivalves were found at Cape Fear, NC (CFBI), Charleston Harbor, SC (CHFJ), Charleston Harbor, SC (CHSF), Sapelo Sound, GA (SSSI), Savannah River Estuary, GA (SRTI), Naples Bay, FL (NBNB), Rookery Bay, FL (RBHC), Charlotte Harbor, FL (CBBI), and Cedar Key, FL (CKBP) respectively. Seven of these nine sites (CFBI, CHFJ, CHSF, NBNB, RBHC,CBBI, CKBP) are included among the most contaminated sites and only one of them (NBNB) would remain in that catagory were it not for high concentrations of arsenic. It may be that the bivalve data are simply reflecting a naturally high level of arsenic in the southeastern United States. If so, the arsenic levels would be beyond human control and, strictly speaking, arsenic could not be considered a contaminant. However, in the absence of documentation of regionally elevated arsenic levels in the southeast, those sites will be included on list of contaminated sites. Rather than being high in the southeast, the arsenic concentrations in fish livers appear unique at the two Benthic Surveillance sites in Alaska. They are distinguished solely on the basis of arsenic concentrations and that, too, may be a reflection of local mineralogy. Until that is shown to be so, those sites will be considered among the most contaminated.

For the most part, in terms of indicating contaminated sites, the bivalve and fish liver data are complimentary. The exceptions are fish livers from Buzzards Bay, Delaware Bay, Galveston Bay, and San Antonio Bay which were not among the most contaminated sites while the bivalves were; and bivalves from Coos Bay and the Columbia River were not particularly

Table 9. East Coast sites that are among the most contaminated on the basis of contaminant levels in bivalves and fish livers. Sites are grouped if they are located within approximately 20 km of one another.

Specific	Siteb
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•	•	
General Location Casco Bay ME	Code CSC	Contaminant (ranking) Pb(1) Ag(3)
Salem Harbor MA	SAL	tChIP(3) Cr(4)
Boston Harbor MA	BHDI	tChIP(6) tPAH (9) tPCB(12) Pb(6) Hg(5) Sn(7)
Boston Harbor MA	BHDB	tPAH(5) tPCB(8) Cr(15) Pb(4) Sn(6)
Boston Harbor MA	BHHB	tPAH(6) tPCB(14) Cr(12) Pb(5)
Boston Harbor MA	BOS	tChIP(1) tPCB(2)
Buzzards Bay MA	BBAR	tChIP(7) tDDT(8) tPCB(1) Pb(15)
Buzzards Bay MA	BBRH	tPCB(10)
Buzzards Bay MA	BBGN	tPCB(9)
Long Island Sound CT	LIHR	Cr(2)
Hud/Rar Estuary NY	HRUB	tChIP(8) tDDT(12) tPAH (2) tPCB(4) Cd(5) Cr(1) Pb(3) Hg(2) Ni(9) Sn(1)
Hud/Rar Estuary NY Hud/Rar Estuary NY Long Island Snd NY	HRLB HRJB LITN	tChIP(1) tDDT(1) tPAH(12)tPCB(2)Hg(10)Sn(3) tChIP(14) tDDT(15) tPAH(14) tPCB(15) Sn(15) tChIP(10) tDDT(10) tPAH(7) tPCB(11)Pb(7) Sn(10)
Long Island Snd NY	LIMR	Pb(14) tChIP(15)
W. Long Island Snd NY	WLI	Pb(4) Ni(1) Sn(3)
New York Bight NJ	NYSH	tChIP(4) tDDT(7) PCB(7) Pb(9) Sn(5)
New York Bight NJ	NYSR	tChIP(2) tPCB(3) Sn(12)
New York Bight NJ	NYLB	Sn(13)
Delaware Bay DE	DBBD	Cd(8) Ni(10) Ag(13)
Delaware Bay DE	DBKI	Cd (4) Ni(11) Ag(4)
Delaware Bay DE	DBFE	Ni(13) Ag(14)
Delaware Bay DE	DBAP	Cd(2) Ni(7)
Chesapeake Bay MD	CBMP	Cd(3) Ni(3) Ag(3) Sn(9)
Chesapeake Bay MD	CBHP	Ni(5) Ag(8)
Cape Fear NC	CFBI	As(1) ·
Charleston Harbor SC	CHFJ	As(4) Ag(15)
Charleston Harbor SC	CHSF	As(5) Sn(11)

a Criteria for inclusion of a Mussel Watch site on this list is given in the text and as footnotes to Table 10.

b Three letter code designates a Benthic Surveillance site, four letter code designates a Mussel Watch site.

Table 10. Gulf Coast sites that are among the most contaminated on the basis of contaminant levels in bivalves and fish livers. Sites are grouped if they are located within approximately 20 km of one another. No fish liver data from the Gulf of Mexico ranked high enough for inclusion of a Benthic Surveillance site on this list **a**.

	Specific Site ^b	
General Location Naples Bay FL Rookery Bay FL	<u>Code</u> NBNB RBHC	Contaminant (ranking) tChIP(11) As(9) Sn(2) As(6)
Charlotte Harbor FL	CBBI	As(3)
Tampa Bay FL	ТВРВ	Hg(1)
Cedar Key FL	CKBP	As(2)
St. Andrew Bay FL	SAWB	tDDT(11) tPAH(3)
Choctawhatchee B.FL	CBSP	tDDT(6) Hg(15) Ag(12)
Vermillion Bay LA	VBSP	Cd(10) Ag(7)
Joseph Hrb. Bayou LA	JHJH	Sn(4)
Galveston Bay TX	GBYC	tChIP(5) tPCB(6)
Matagorda Bay TX Matagorda Bay TX	MBGP MBLR	Hg(4) Ni(1)
San Antonio Bay TX San Antonio Bay TX	SAMP SAPP	Ag(5) Cr(3)
Copano Bay TX Aransas Bay TX	CBCR ABLR	Cd(1) Ag(1) Ag(10)

a Criteria for inclusion of a Mussel Watch site on this list are that it displays: (1) three or more contaminant concentrations ranking in the upper 15 concentrations, or (2) two concentrations ranking in the upper 10, or (3) at least one concentration ranking in the upper 5, or (4) that at least one contaminant concentration is in the upper 15 concentrations and the site is located within 20 km of a site meeting any of the prior three criteria for that contaminant. The criteria for inclusion of a Benthic Surveillance site on this list are that at least two mean concentrations rank in the upper five of 43 concentrations or that a single concentration ranks in the upper three. The rankings of concentration of these twelve chemicals have been used to compile this list: tChIP, tDDT, tPAH, tPCB, As, Cd, Cr, Pb, Hg, Ni, Ag, and Sn. Fish livers were not analyzed for tPAH.

b Three letter code designates a Benthic Surveillance site, four letter code designates a Mussel Watch site.

Table 11. West Coast sites that are among the most contaminated on the basis of contaminant levels in bivalves and fish livers. Sites are grouped if they are located within approximately 20 km of one another.

Sn	ecific	Siteb
OD.		JILE

•	phecine 30	le .			
General Location San Diego Bay CA San Diego Harbor CA San Diego Bay CA	Code SDHI SDA SDF	Contaminant (ranking) tPAH(8) tPCB(5) Cd(15) tPCB(1) Ni(2) Hg(3) tDDT(4) Ni(5)			
Dana Point CA	DAN	tDDT(5) Cd(4) Hg(2) Ag(5)			
San Pedro Harbor CA Palos Verdes CA Anaheim Bay CA Marina Del Ray CA Seal Beach CA San Pedro Canyon CA Santa Monica Bay CA	SPFP PVRP ABWJ MDSJ SEA SPC SMB	tDDT(2) tDDT(3) tDDT(4) Pb(2) Cr(6) Pb(1) tChiP(5) tDDT(2) tPCB(4) tDDT(1) tPCB(5) tDDT(3) Ag(1)			
San Simeon Point CA	SSSS	Cr(10) Ni(6)			
San Francisco Bay CA San Francisco Bay CA Oakland Harbor CA Southhampton Shoal CA Hunters Point CA	SFDB SFSM OAK SHS HUN	tChIP(3) tDDT(5) Cd(12) Hg(12) tChIP(13)Hg(13) tChIP(4) Hg(4) Cd(1) Hg(1) Ni(4) tChIP(2) Cd(3)			
Tomales Bay CA	TBSR	Cr(8) Hg(9) Ni(2)			
Humboldt Bay CA	HMBJ	Cr(5)			
Point St. George CA	sgsg	Cr(7) Ni(4)			
Coos Bay OR	000	As(1)Cr(1) Sn(1)			
Columbia River OR	COL	Cd(5) Cr(3)			
Bellingham Bay WA	BBSM	Cr(4) Hg(8) Ni(8)			
Elliott Bay WA Elliott Bay WA	EBFR ELL	tPAH(1) tPCB(13) tPCB(3) Pb(2) Sn(2)			
Commencement Bay WA	СОМ	Pb(3)			
Nisqually Reach WA	NIS	Cd(2) Cr(5) Ni(3)			
Nahku Bay AK	NAH	As(2)			
Lutak Inlet AK	LUT	As(3)			
Barber's Point HI BPBP tPAH(4) Pb(13) Hg(3) Honolulu Harbor HI HHKL As(10) Hg(11) Ag(2) a Criteria for inclusion of a Mussel Watch site or a Benthic Surveillance Site on this list are given in the text and as footnotes to Table 10. b Three letter code designates a Benthic Surveillance site, four letter code designates a Mussel Watch site.					

¹⁸

contaminated while fish livers from these sites did display high contaminant loads. These exceptions may simply reflect localized contamination within their respective areas. For example, in Galveston and San Antonio Bays, where fish livers did not appear contaminated neither did the bivalves at all the sites within those bays. Bivalves from all sites within Buzzards and Delaware Bays, on the other hand, appeared contaminated, but the fish livers did not.

These discrepancies aside, there is a common attribute of most sites that are listed among the most contaminated. These are sites near the coastal cities of Boston, New Bedford, New York, Phildelphia/Wilmington, Baltimore, Tampa, Galveston, San Diego, Los Angeles, San Francisco - Oakland, Seattle, and Tacoma. To a first approximation, the result of analyzing tissues from about 200 sites around the nation has been to highlight the population centers. However, closer examination of the data reveals more than just a general coincidence of contamination with human population. Not all sites near population centers are among the most contaminated sites. This is seen most readily by the listing in Table 6 of sites with no highly ranked contaminant concentrations. Included among these are sites in Boston Harbor, Long Island Sound, Chesapeake Bay, Tampa Bay, Galveston Bay, sites in southern California, and sites in Puget Sound.

It requires detailed analyses of local situations to discern why there are such sites close to contaminated sites. That will not be done in this overview of the national situation but it is of national interest to indicate that the NS&T program is determining the spatial extents of contamination as well as indicating that population centers are generally the focus of the higher levels of contamination. Local analyses will also be needed to understand why some apparently remote sites such as those along the Gulf coast are listed among the most contaminated.

TEMPORAL VARIABILITY

Data are collected annually to determine temporal trends in contamination. It also provides a check on the validity of a site's inclusion among the most contaminated. If a site appears highly contaminated in one year and lightly contaminated in the next, one would suspect a general characterization of the site as being among the highly contaminated.

Data are available for tChIP, tDDT and tPCB in fish livers from the northeast and west coasts for 1984 and 1985 and are summarized in Tables 12 and 13, respectively. Those two coasts include all the sites at which the highest levels or organic contaminants were found in fish livers in 1984. Comparing the rankings of concentrations for the two years reveals that for tDDT four of the upper five sites in 1984 remain in the upper five for 1984 (one site, Southampton Shoal [SHS], moved from eight in 1984 to fifth in 1985, while the Dana Point [DAN] site moved from fifth in 1984 to sixth in 1985), for tPCB four sites were represented among the upper five for both years (one site, Santa Monica Bay [SMB], moved up from seventh in 1984 to fourth in 1984 while the San Pedro Canyon [SPC] site moved down from fifth to eigth). With the total non-DDT chlorinated pesticides two of the 1984 high ranking sites do not appear near the top of the 1985 list. One of them, Oakland Harbor [OAK], was not sampled in 1985. The mean concentration at the other site, Salem Harbor [SAL], fell more than three-fold and it was no longer among the most contaminated sites. This probably reflects the very high variability seen in 1984 which caused the mean concentration to be driven by one very high concentration

among the three individual concentrations. The general agreement between years reinforces the designations of sites among the most contaminated, but the exceptional case, Salem Harbor, demonstrates the value of annual sampling in finding cases that are skewed by one or a few extraordinary samples.

Since there is variability in these measurements at all sites, no changes over only two years can be interpreted as a temporal trend. Nevertheless, of the 81 cases on Tables 12 and 13, only nine show differences between the two years that exceed two standard deviations and in three of them the difference may be attributable to different species having been analyzed. (It is always the goal to collect the same species, but occasionally with fish the primary target species cannot be caught). Over a longer time scale a temporal trend may appear, but on the basis of only these data short term temporal change is not evident.

DISCUSSION

The single largest misgiving with using tissue data to identify contaminated sites over a national scale is that, over such a scale, it is impossible to use only one species. It was obvious that copper and zinc concentrations in bivalves are so species dependent that they cannot serve to define contaminant distributions. It was mentioned that concentrations of the elements silver, lead and chromium may be influenced by bivalve species. The fact that the two Hawaiian sites were found among the most contaminated was unexpected and may be due, not to contamination, but to unique characteristics of the oyster species which was collected at only those two sites. Some of what little temporal variability there was in fish liver data may be attributed to different species having been sampled in different years.

Sediment samples were collected at almost all the Mussel Watch and Benthic Surveillance sites and analyzed for the same suite of chemicals for which tissues were analyzed. In a sense, so long as the data is normalized for particle size, sediment can be considered a single species that is available everywhere. That data will be analyzed in a subsequent report and used, again, to identify and list the most contaminated sites. In the absence of species effects that listing should match the one created in this report. Differences between those listings will be used to quantify the influence that species has been exerting on contaminant concentrations in tissues.

Regardless of a species effect, however, it is tissue data that will serve best to reveal any temporal trends in contamination at a particular site. At a site, so long as the same species is collected, the effect of species on contaminant concentration is irrelevant. Depending on the local sediment dynamics, the sediment sample analyzed at any given site will be a composite of some number of prior years. On the other hand, fish and bivalves, when transplanted to clean areas, are known to cleanse themselves of contaminants. So, if the ambient level of contamination at a site goes through a significant increase or decrease in any year, that change is much more likely to be manifest in tissue analysis than in sediment analysis.

While the results of this analysis of tissue data are subject to modification upon analysis of sediment data, these data do serve as the beginning of a database with which to identify temporal trends in contamination.

Table 12. Fish liver concentrations of tChIP, tDDT, and tPCB (ng/g, ppb, dry weight) for Northeast Coast sites sampled in 1984 and 1985

		1	984		1	985	
General Location C	ode s	pecies*	tChIP	c.v.%	species	tChIP	c.v.%
Casco Bay ME	CSC	wf		94	lhs	106	26
Merrimack River MA	MER	wf	89	22	wf	196	23
Salem Harbor MA	SAL	wf	621	116	wf	183	17
Boston Harbor MA **	BOS	wf	1078	13	wf	610	11 .
Buzzards Bay MA	BUZ	wf	40	29	wf	69	26
Narragansett Bay RI	NAR	wſ	119	28	wf	100	21
East Long Is.Snd CT	ELI	wf	101	21	wf	116	34
West Long Is. Snd NY	WLI	wf	282	14	wf	217	46
Delaware Bay DE	DEL	wpf	52	30	wpf	90	29
Ches. Bay Lower VA	LCB	Ac	169	69	sp	92	12
		•	1984			1985	
General Location (Code _	species*	tDDT	c.v.%	species	tDDT	
Casco Bay ME **	CSC	wf	46	65	ihs	420	31
Merrimack River MA **	MER	wf	77	33	wf	502	10
Salem Harbor MA	SAL	wf	583	58	wf	328	23
Boston Harbor MA	BOS	wf	827	16	wf	625	19
Buzzards Bay MA	BUZ	wf	56	6	wf	59	26
Narragansett Bay RI	NAR	wf	104	25	wf	208	32
East Long Is. Snd CT*	' ELI	wf	48	6	wf	224	29
West Long Is. Snd NY	WLI	wf	105	28	wf	306	40
Delaware Bay DE	DEL	wpf	254	12	wpf	462	39
Ches. Bay Lower VA**	LCB	Ac	140	10	sp	84	5
			1984			1985	
Concrettop	Codo	species*	tPCB	c.v.%	species	tPCB	c.v.%
	CSC		1016	67	lhs	1208	37
Casco Bay ME Merrimack River MA **			1371	19	wf	3828	5
Salem Harbor MA	SAL	wf	2959	102	wf	2213	32
Boston Harbor MA	BOS		10486	16	wf	5462	17
Buzzards Bay MA	BUZ		2775	10	wf	3032	22
Narragansett Bay RI	NAR		2210	23	wf	2167	22
East Long Is. Snd CT	ELI	wf	1577	18	wf	1857	33
West Long Is. Snd NY		wf	3222	8	wf	3707	40
Delaware Bay DE	DEL		978	21	wpf	1231	21
Ches. Bay Lower VA	LCB	•	1108	28	sp	417	26
Olies. Day Lower VA					•		

^{*}Species symbols: wf=winter flounder, lhs=longhorn sculpin, wpf= windowpane flounder, Ac=Atlantic croaker, sp= spot

^{**} The ratio of 1984 concentration \pm one std. dev. to the 1985 concentration \pm one std. dev. is > or < 1.0.

Table 13. Fish liver concentrations of tChIP, tDDT, and tPCB (ng/g, ppb, dry weight) for West Coast sites sampled in 1984 and 1985

ence campied in 1004 and	1000							
General Location	Code		1984 * tChIP	a.u.0/	!	1985		
San Diego Harbor CA	SDA	species bsb		<u>c.v.%</u> 53	<u>species</u>		<u>c.v.%</u>	
San Diego Bay CA	SDF	ht	, 347 39	55	bsb	233	24	
Dana Point CA	DAN	ht	38		ht b•	110	31 70	
Dana Point CA	DAN	WC	47		ht	57 50	70	
San Pedro Bay CA	SPC	ht	150	29	WC	59	30	
Seal(Long)Beach CA	SEA	WC	559	29 56	WC	171	125	
Santa Monica Bay CA	SMB	ht	135	8	WC	712	77	
Hunters Point CA **	HUN	sf	641	3	ht	293	39	
Southampton Shl. CA	SHS	sf	93		wc sf	325 255	7	
San Pablo Bay CA	PAB	sf	250	17	sf	255 317	17	
Bodega Bay CA	BOD	sf	nd	17	si sf	166	25	
Bodega Bay CA	BOD	WC	79		WC	25	82	
Coos Bay OR	COO	sf	nd		sf	25 25	88	
Columbia River OR	COL	sf	29	52	si sf	25 35	81 27	
Nisqually Reach WA	NIS	Es	78	125	Si Es	29	27 30	•
Commencement B WA	COM	Es	282	29	Es	355	12	
Elliott Bay WA	ELL	Es	94	33	Es	103		
			1984	33	E9	1985	26	
General Location	Code		* tDDT	c.v.%	species		c.v.%	
San Diego Harbor CA	SDA	bsb	865	24	bsb	942	29	
San Diego Bay CA	SDF	ht	3867	9	ht	3171	47	
Dana Point CA	DAN	ht	3180	36	ht	1451	122	
Dana Point CA	DAN	wc	1752	30	WC	1693	44	
San Pedro Bay CA	SPC	ht	18660	55	WC	5733	75	
Seal(Long)Beach CA	SEA	wc	11821	11	WC	12238	37	
Santa Monica Bay CA	SMB	ht	7462	45	ht	12519	41	
Hunters Point CA	HUN	sf	1308	16	WC	1556	56	
Southampton Shl. CA	SHS	sf	1199	15	sf	1905	15	•
San Pablo Bay CA	PAB	sf	1001	14	sf	1325	28	
Bodega Bay CA	BOD	sf	468	124	sf	985	81	
Bodega Bay CA	BOD	WC	133		WC	225	88	
Coos Bay OR	COO	sf	23	60	sf	605	162	
Columbia River OR	COL	sf	286	25	sf	219	30	
Nisqually Reach WA	NIS	Es	220	92	Es	51	42	
Commencement B WA	COM	Es	504	38	Es	572	15	
Elliott Bay WA	ELL Es	599	63	Es	1139	59		
			984			1985		
General Location		species'		<u>cv%</u> _	species		C V %_	
San Diego Harbor CA	SDA	bsb		12	bsb	14921	59	
San Diego Bay CA	SDF	ht	1978	27	ht	1130	58	
Dana Point CA	DAN	ht	760		ht	1104	76	
Dana Point CA	DAN	WC	1086		WC	929	24	
San Pedro Bay CA	SPC	ht	7130	35	WC	3665	106	
Seal(Long)Beach CA	SEA	WC	7977	38	wc	7649	19	
Santa Monica Bay CA Hunters Point CA	SMB	ht	5912	22	ht	6006	38	
	HUN	sf	6990	39	WC	4245	55	
Southampton Shl. CA	SHS	sf	3734	30	sf	3607	14	
San Pablo Bay CA **	PAB	sf	1191	6	sf	1882	14	
Bodega Bay CA Bodega Bay CA	BOD	sf	548	10	sf	1275	71	
_ ·	BOD	wc	287	16	WC	338	87	
Coos Bay OR Columbia River OR **	COO	sf 	555 704	34	sf	789	39	
	COL	sf -	734	4	sf -	459	19	
Nisqually Reach WA	NIS	Es	1746	85 85	Es	593	33	
Commencement B WA Elliott Bay WA	COM ELL	Es	4313	23	Es	3654	7	
*Species symbols: bsb=bar		Es	7631	30	Es white	11376	47	Harradon
ומשבטים יין וושטום, שטטבשמון	i vu sailu l	-a33,111=	HOLLIYILG	au iuiuul.	WU= WIIII	JUUKKEI.	sı=starrV t	Jounger

^{*}Species symbols: bsb=barred sand bass,ht=hornyhead turbot, wc= white croaker, sf=starry flounder Es=English sole.

^{**} The ratio of 1984 concentration \pm two std. devs. to the 1985 concentration \pm two std. devs. is > or < 1.0.

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NOAA, 1987. National Status and Trends Program - A Preliminary Assessment of Findings of the Benthic Surveillance Project-1984. NOAA Office of Oceanography and Marine Assessment, Rockville MD, 81 pp.

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Snedecor, G.W., and W.G. Cochran, W.G. 1967. Statistical Methods. 6th Edition. The Iowa State University Press. Ames, 593 pp



APPENDIX A. SITE LOCATION MAPS

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APPENDIX A. SITE LOCATION MAPS

National Status and Trends Program

Site Location Maps, Site Names and Designation of Site Codes

Benthic Surveillance Sites are Designated by Three-Letter Codes Mussel Watch Sites are Designated by Four-Letter Codes

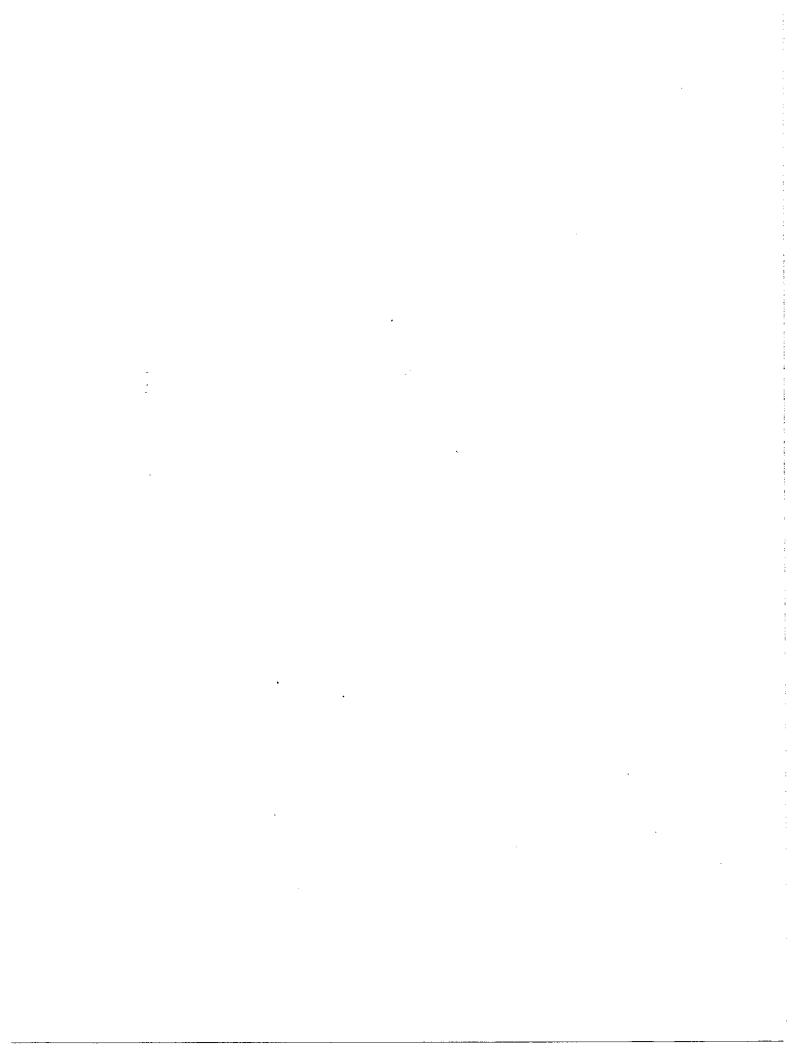
MAP SEQUENCE

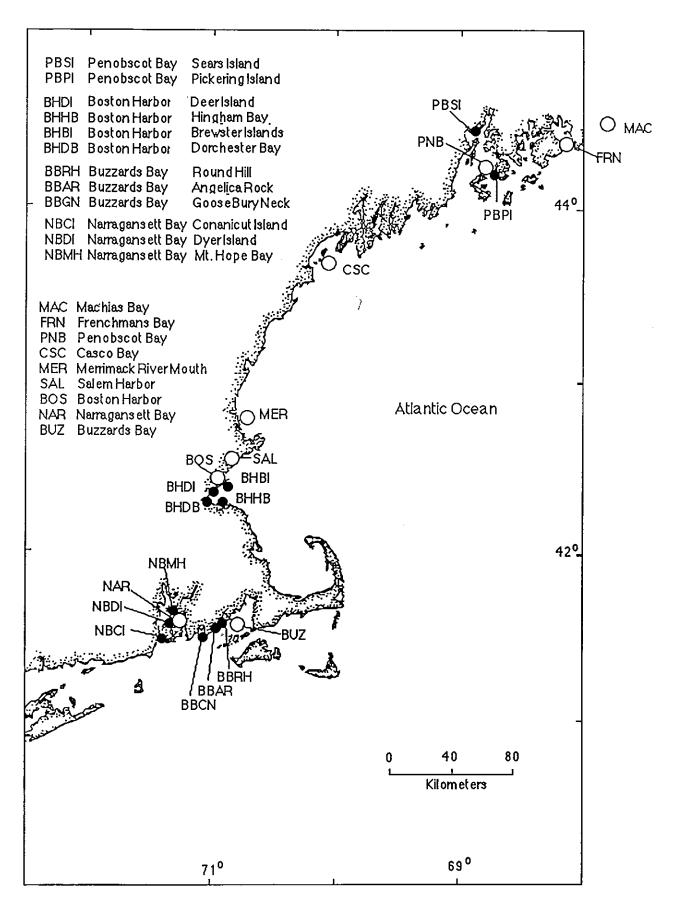
Penobscot Bay to Narragansett Bay	A -1
Long Island Sound to New York Bight	A -2
Delaware Bay to Chesapeake Bay	A -3
Roanoke Sound to Biscayne Bay	A -4
South Florida	A -5
Tampa Bay	A -6
Middle Florida	A -7
Western Florida	A -8
Missississippi to Alabama	A -9
Eastern Louisiana and Mississippi Delta	A-10
Western Louisiana	A-11
Galveston Bay	A-12
South Texas	A-13
Laguna Madre South Bay	A-14
Southern California and Hawaii	A-15
Point Conception to Point Arena	A-16
Point Delgada to Yaquina Head	A-17
Northwest Pacific	A-18
Alaska	A-19

Tissue samples or tissue contaminant concentration data are not necessarily available for each site whose designation and location are shown.

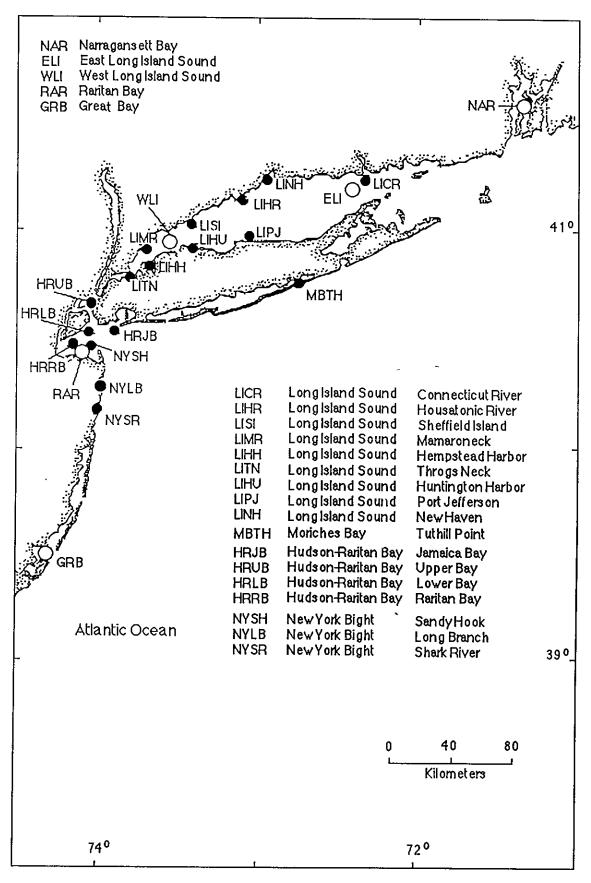
Base maps for east and west coast sites were extracted from the Phase 1 Final Report on the Mussel Watch Project by Battelle Ocean Sciences and Science Applications International Corporation, Inc.

Base maps for the Gulf of Mexico sites were extracted from the Phase 1 Final Report on the Mussel Watch Project by The Geochemical and Environmental Research Group of Texas A&M Research Foundation.

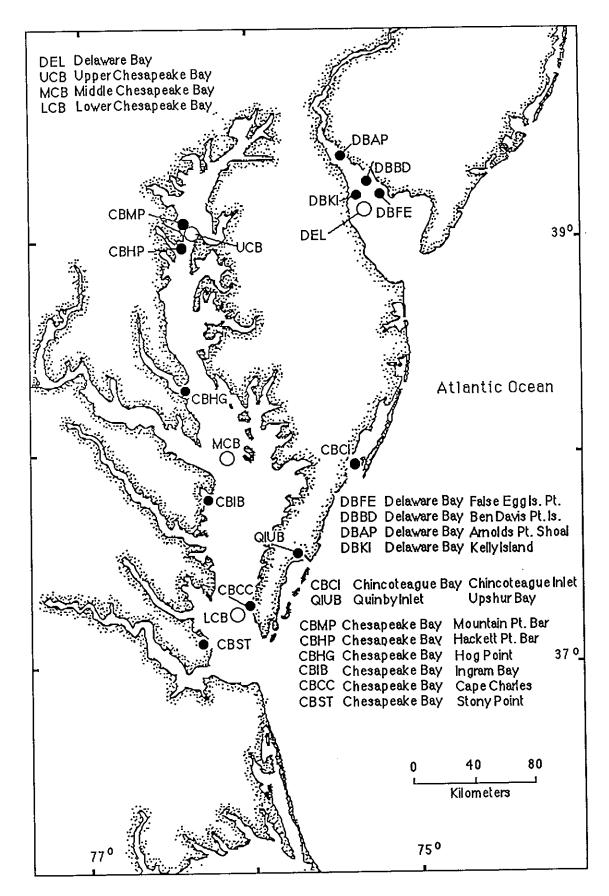




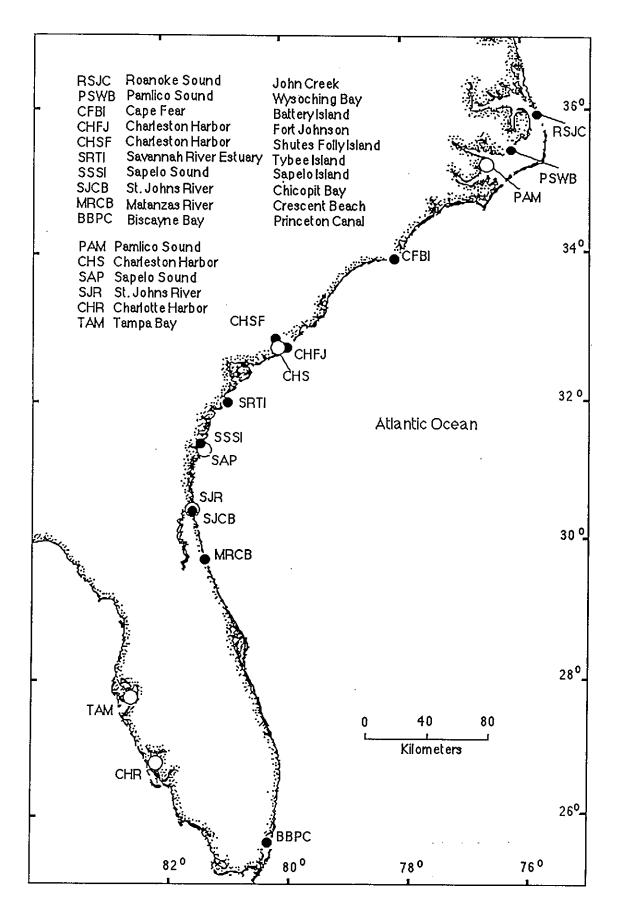
Penobscot Bay to Narragansett Bay



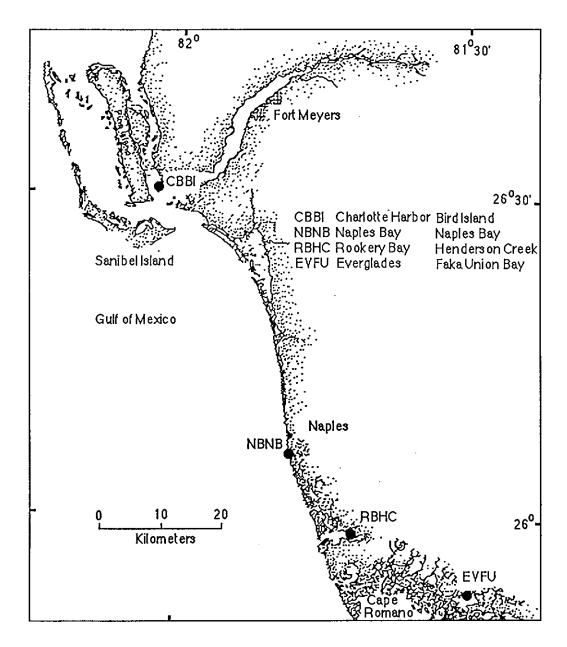
Long Island Sound to New York Bight



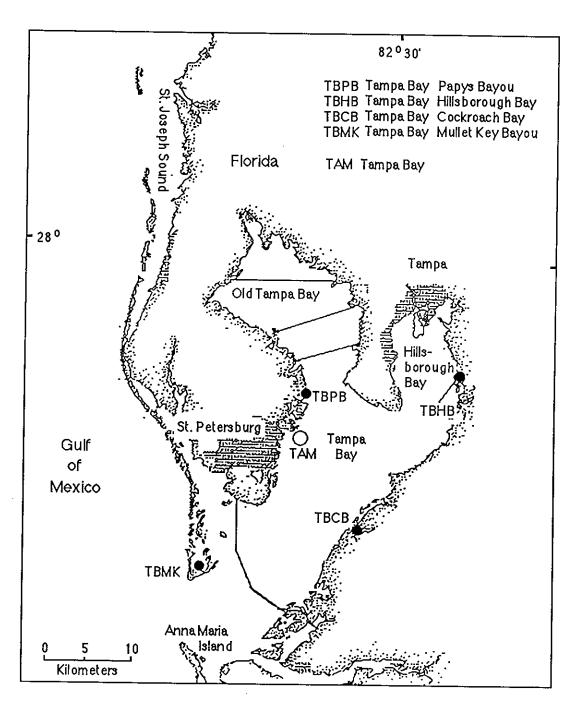
Delaware Bay to Chesapeake Bay



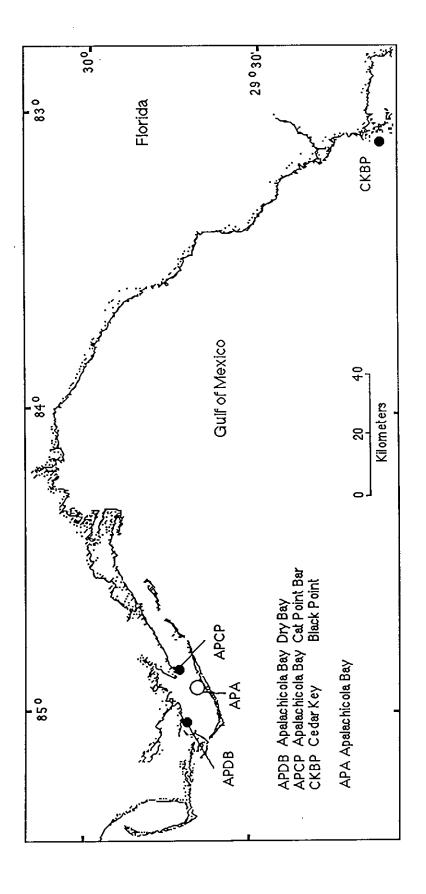
Roanoke Sound to Biscayne Bay



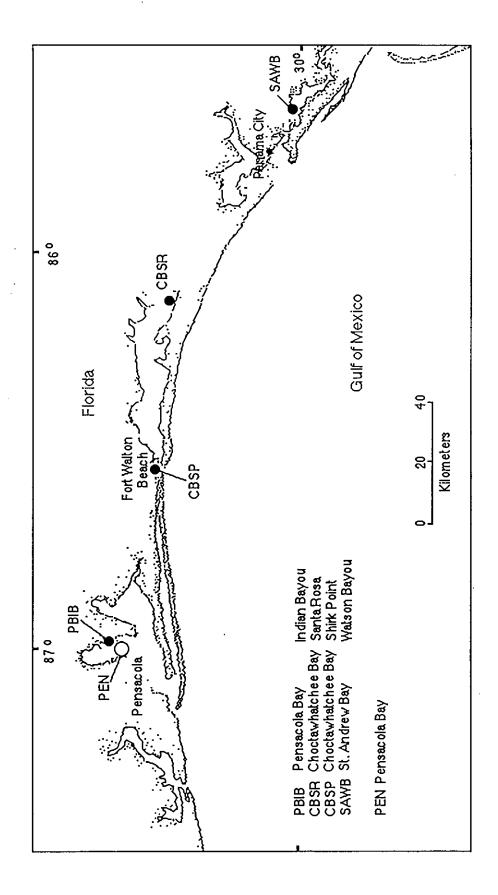
South Florida



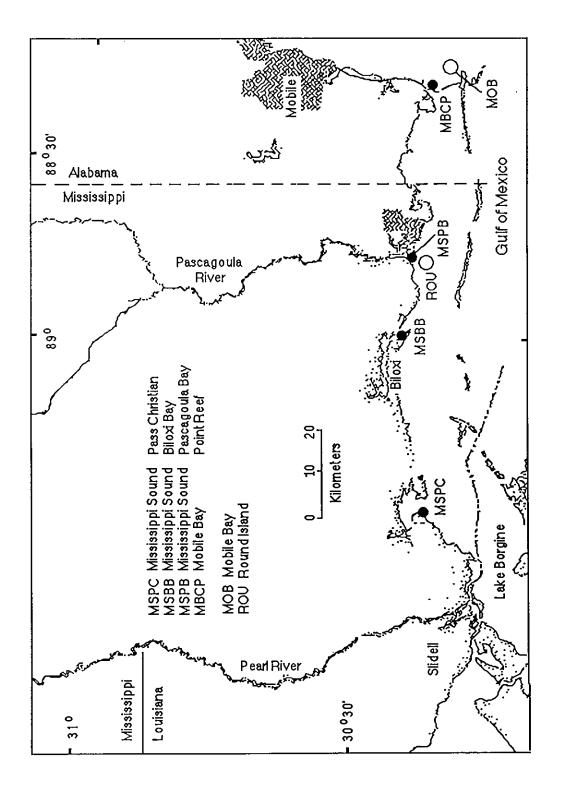
Tampa Bay



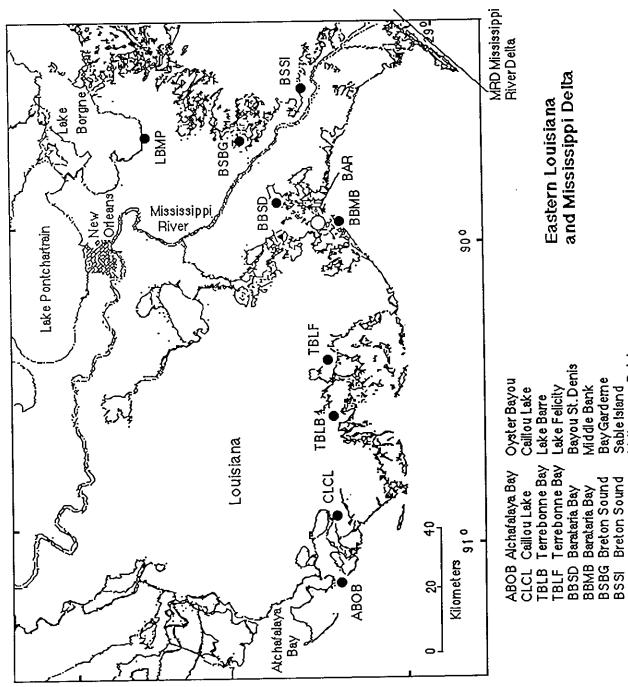
Middle Florida



Western Florida



Mississippi - Alabama



Eastern Louisiana and Mississippi Delta

BAR Barataria Bay

Malheureux Point

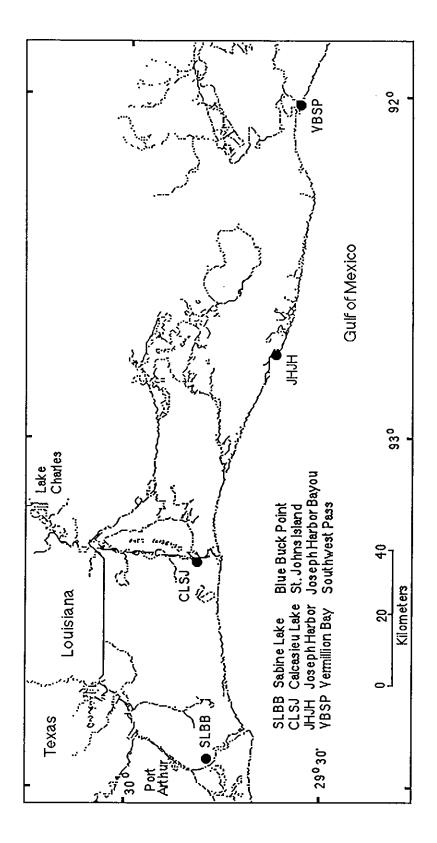
Lake Borgne

LBMP 1

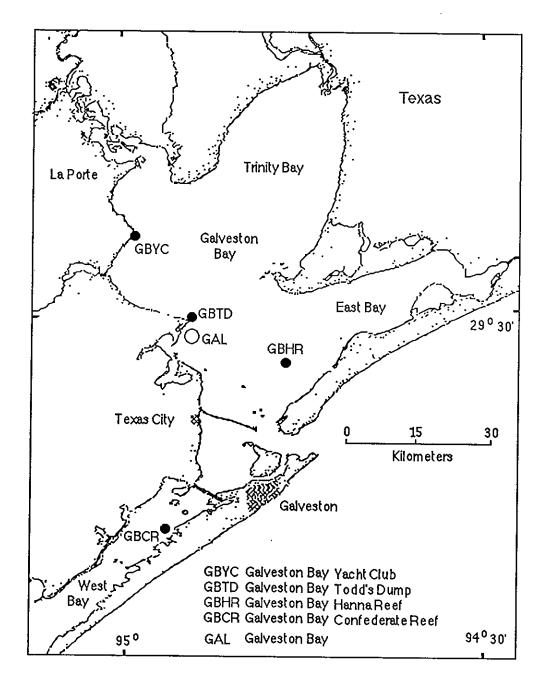
3ay Gardeme

Sable Island

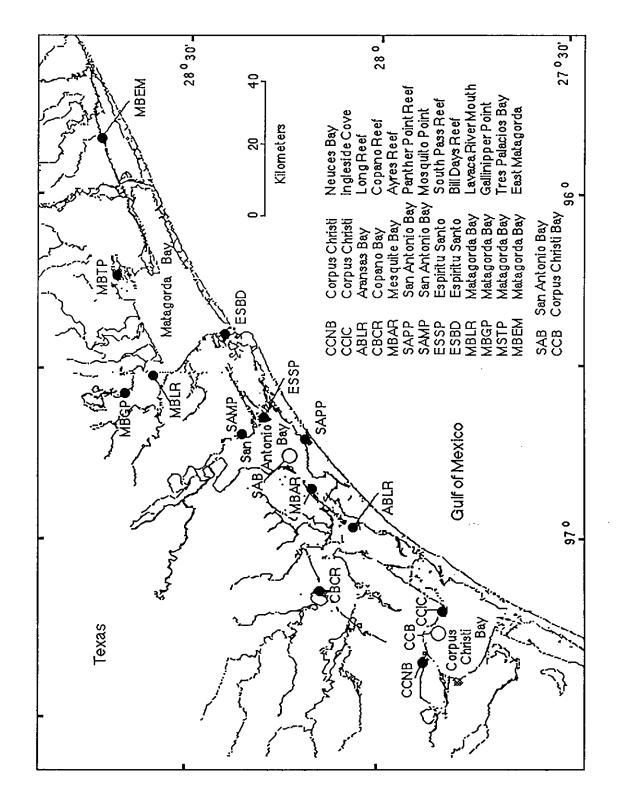
viiddle Bank

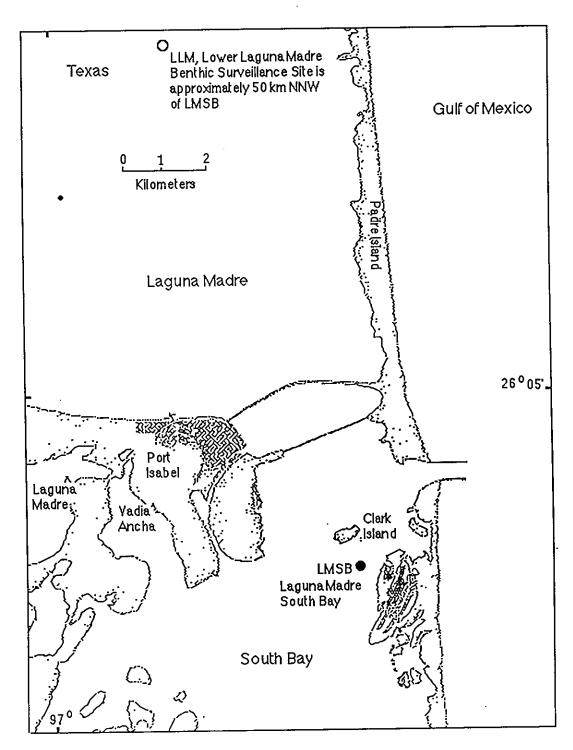


Western Louisiana

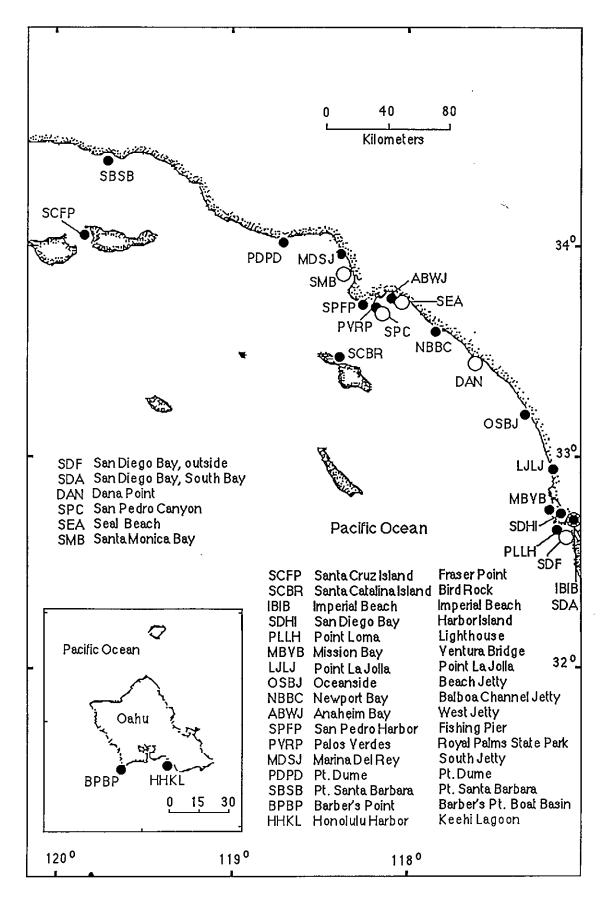


Galveston Bay

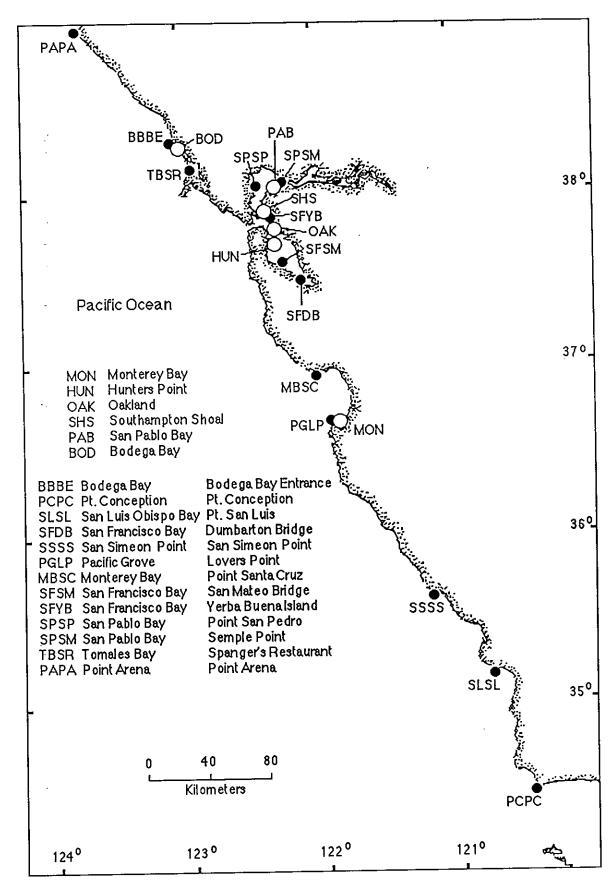




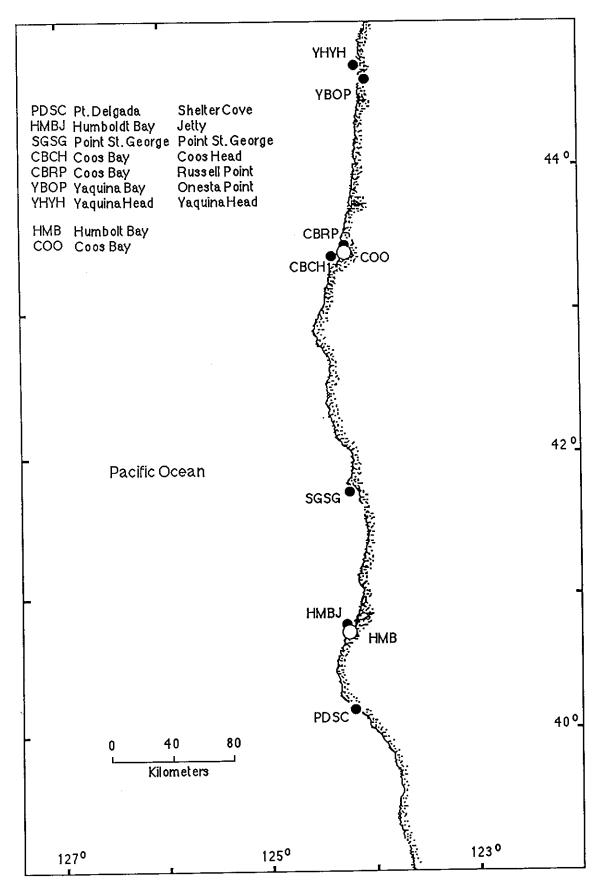
Laguna Madre South Bay



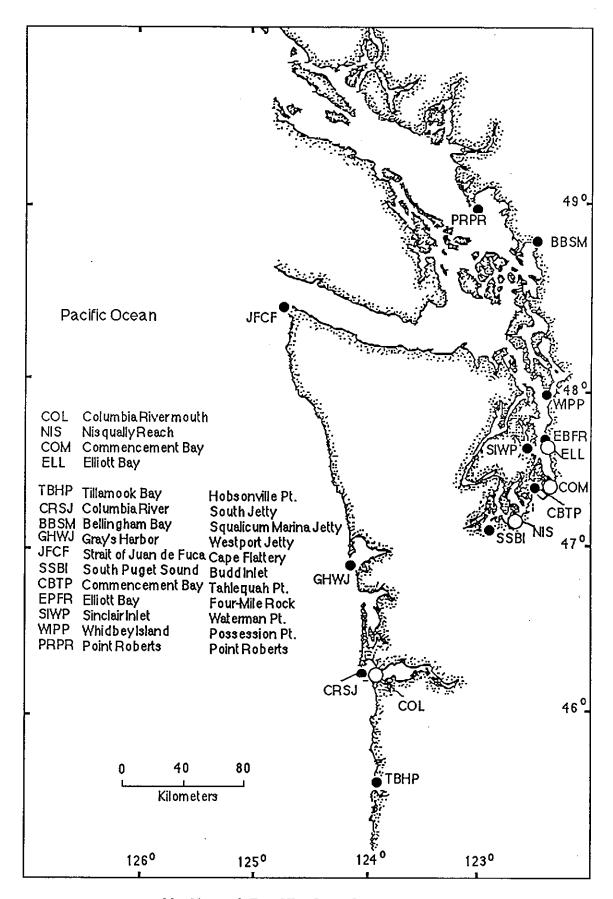
Southern California and Hawaii



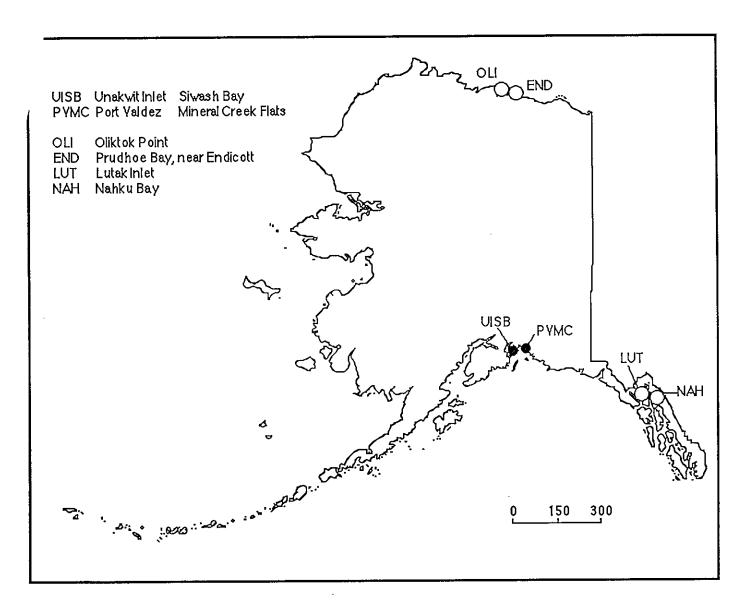
Point Conception to Point Arena



Point Delgada to Yaquina Head



Northwest Pacific Coast



Alaska

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APPENDIX B. RANKED CONTAMINANT CONCENTRATIONS IN BIVALVES

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APPENDIX B. RANKING OF CONTAMINANT CONCENTRATIONS IN BIVALVES

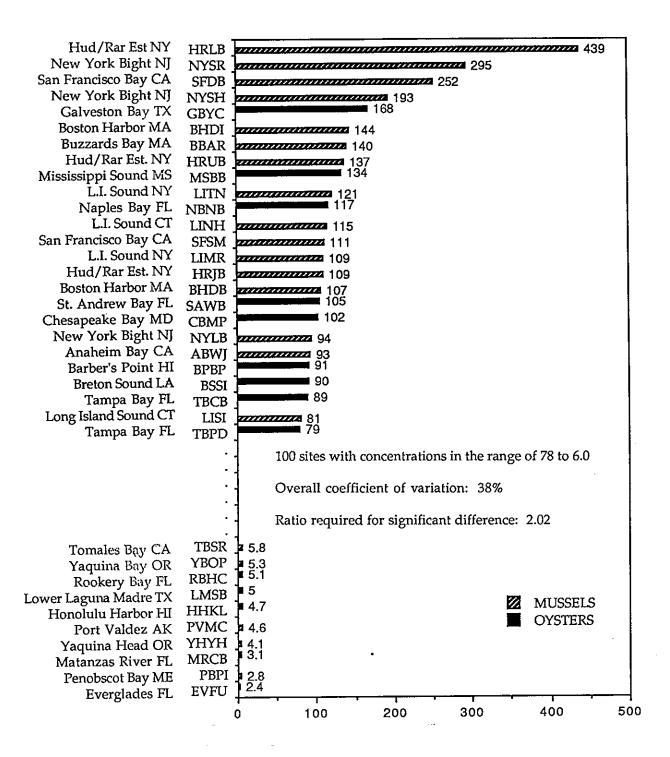
National Status and Trends Program

Plots of Ranked Contaminant Concentrations Observed in Bivalves Collected in 1986

Sequence of Plots by Contaminant

Total (non-DDT) Pesticides	B -1
Total DDT	B -2
Total Polychlorinated Biphenyls	B -3
Total Polyaromatic Hydrocarbons	B -4
Antimony	B -5
Arsenic	B -6
Cadmium	B -7
Chromium	В -8
Copper (mussels)	В -9
Copper (oysters)	B-10
Lead	B-11
Mercury	B-12
Nickel	B-13
Selenium	B-14
Silver	B-15
Thallium	B-16
Tin	B-17
Zinc (mussels)	B-18
Zinc (ovsters)	B-19

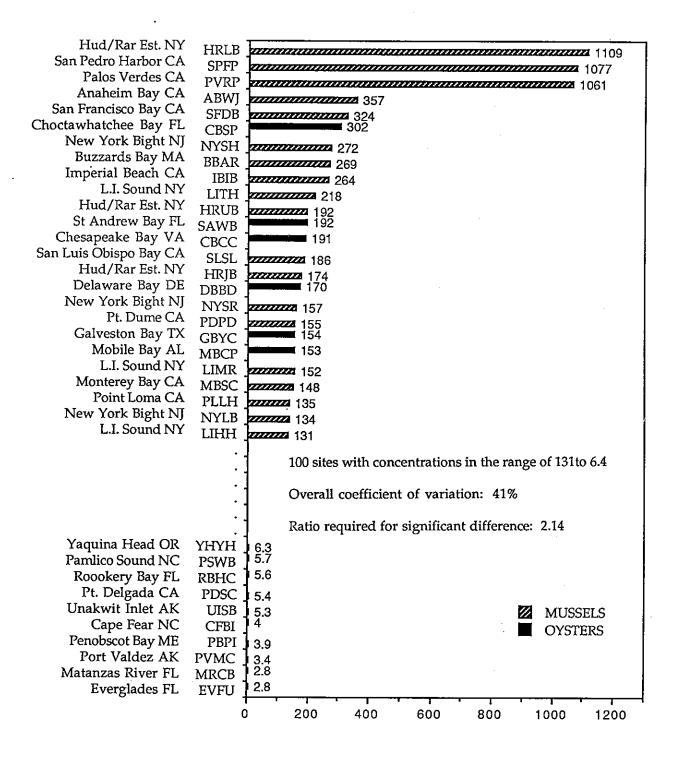
Total (non-DDT) Pesticides in Bivalves



Total (non-DDT) Pesticides ppb (ng/g) dry weight

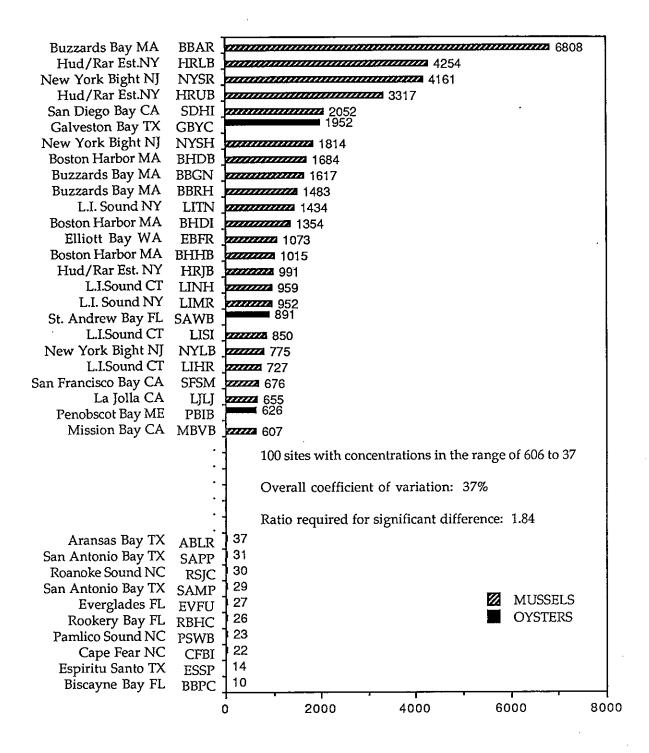
tChlP

Total DDT in Bivalves



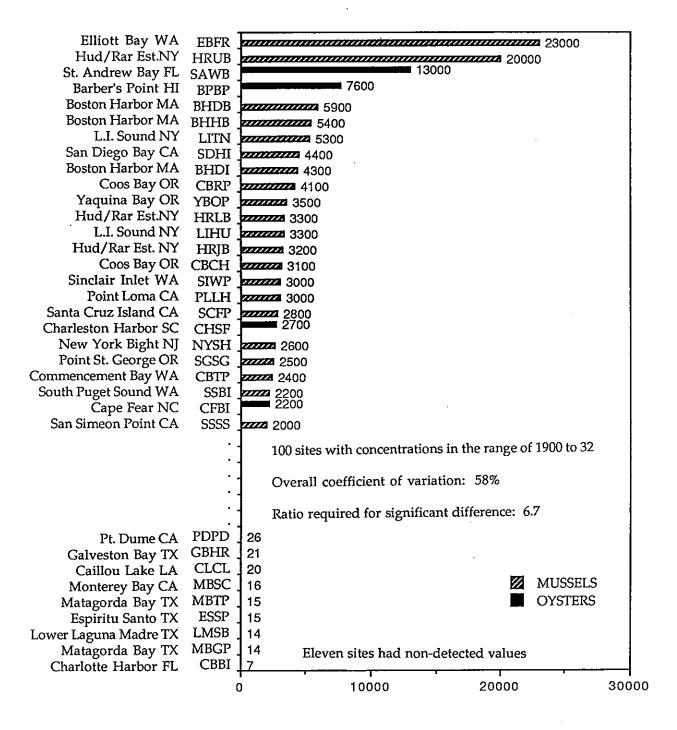
Total DDT ppb (ng/g) dry weight

Total PCB in Bivalves



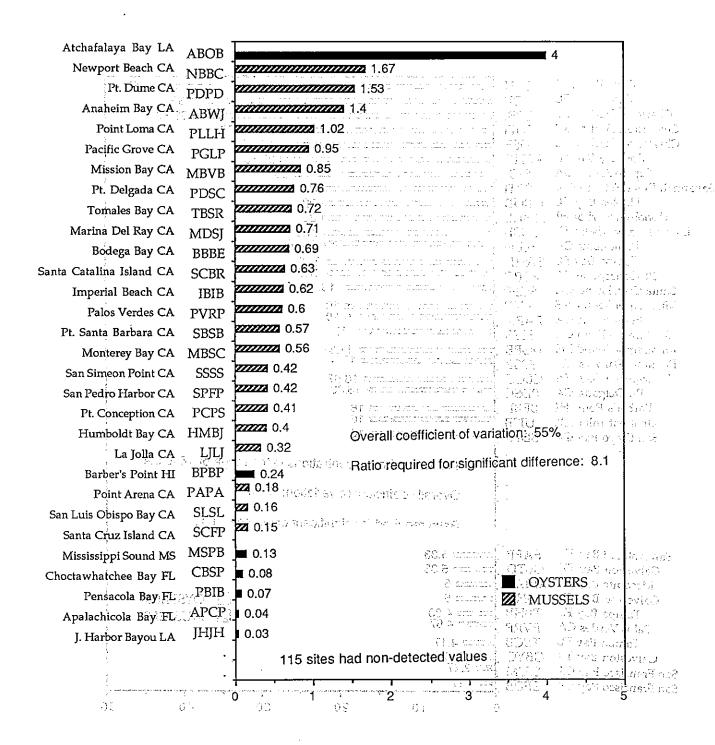
Total PCB ppb (ng/g) dry weight

Total PAH in Bivalve Tissue



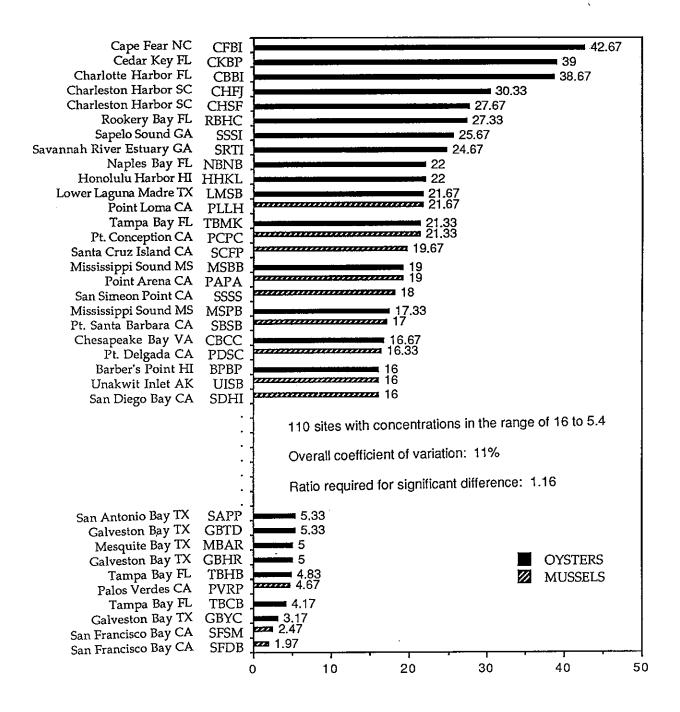
PAH ppb (ng/g) dry weight

Antimony in Bivalve Tissue



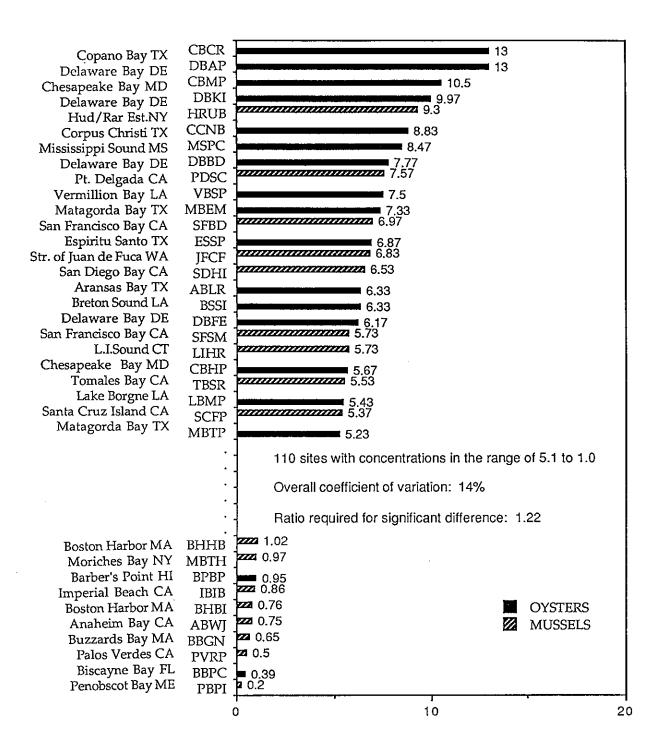
Sb ppm (µg/g) dry weight

Arsenic in Bivalve Tissue



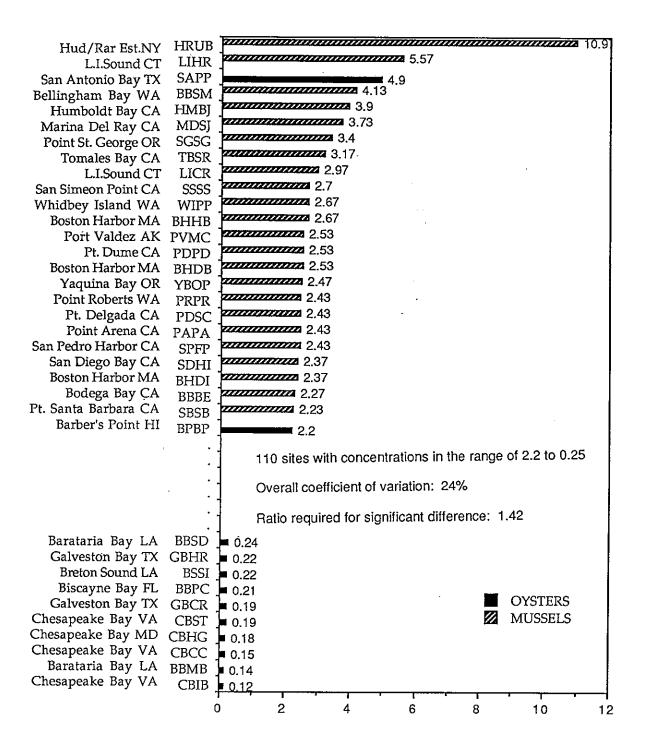
As ppm (µg/g) dry weight

Cadmium in Bivalve Tissue



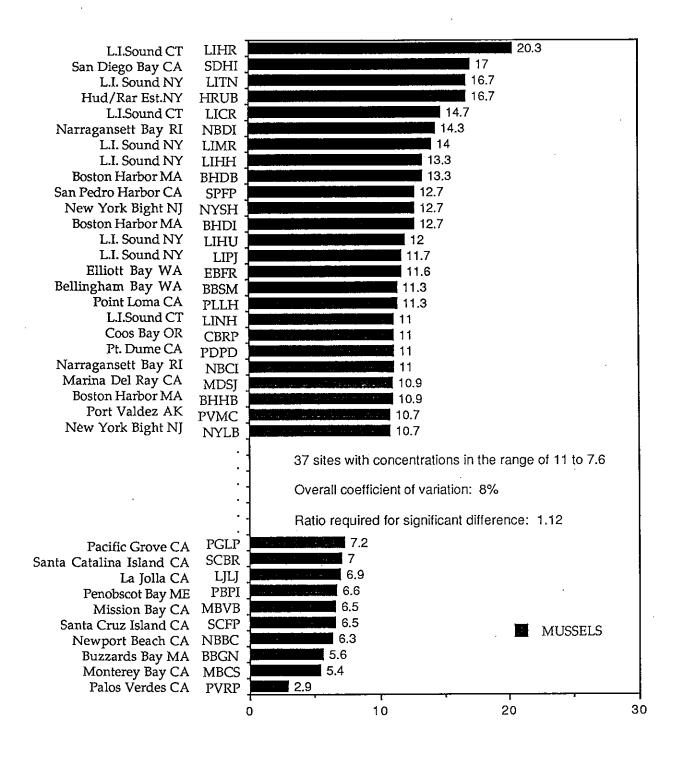
Cd ppm (µg/g) dry weight

Chromium in Bivalve Tissue



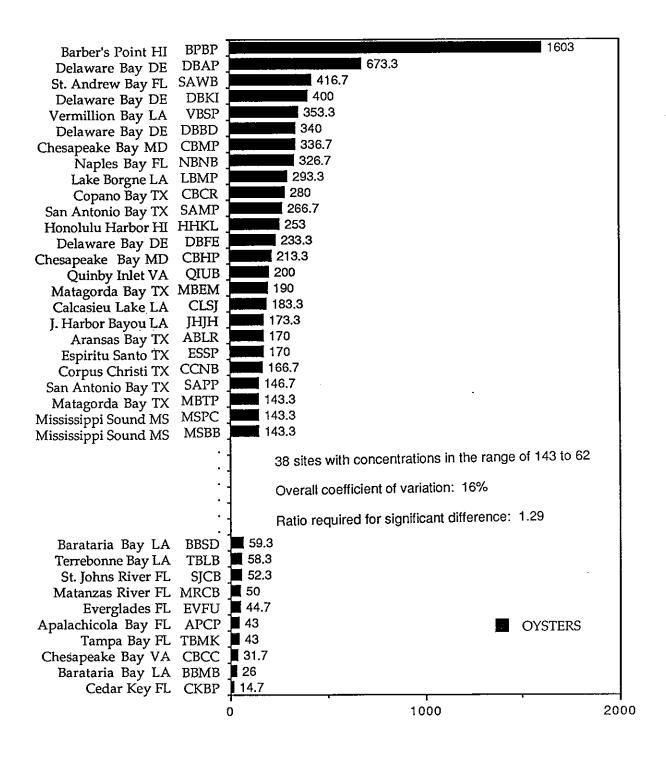
Cr ppm (µg/g) dry weight

Copper in Bivalve (Mussels) Tissue



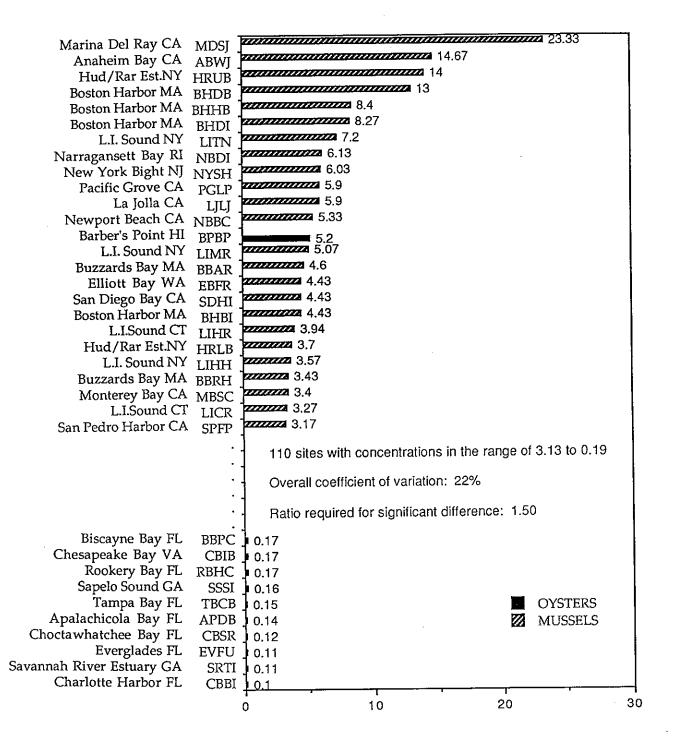
Cu ppm (µg/g) dry weight

Copper in Bivalve (Oysters) Tissue



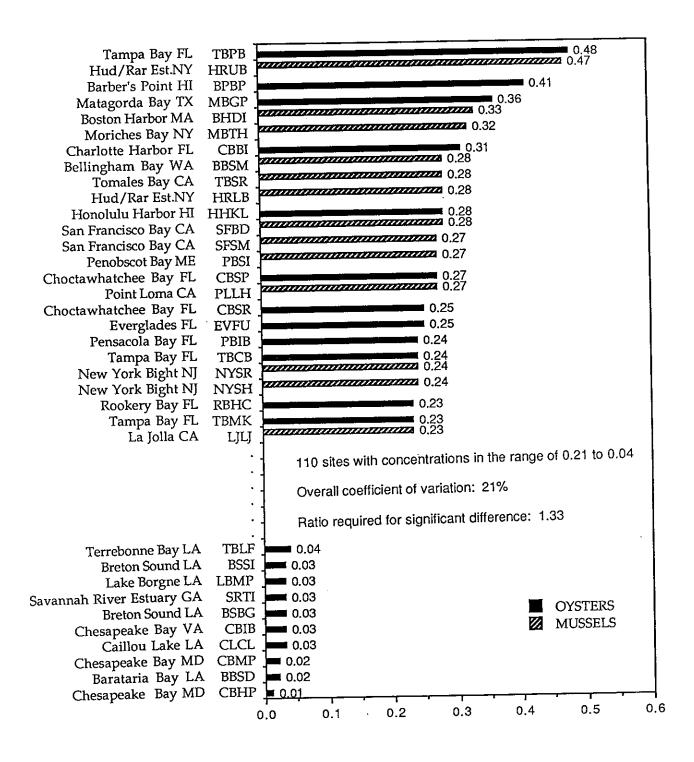
Cu ppm (µg/g) dry weight

Lead in Bivalve Tissue



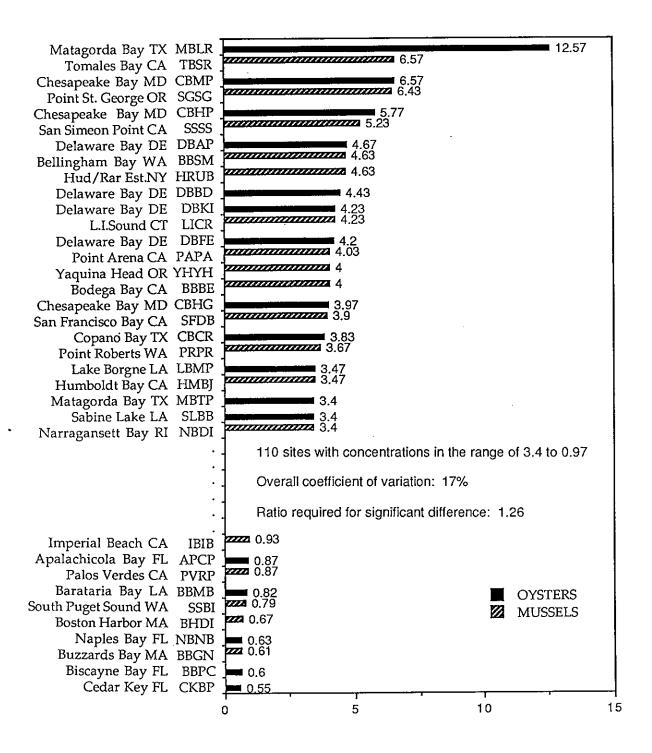
Pb ppm (μg/g) dry weight

Mercury in Bivalve Tissue



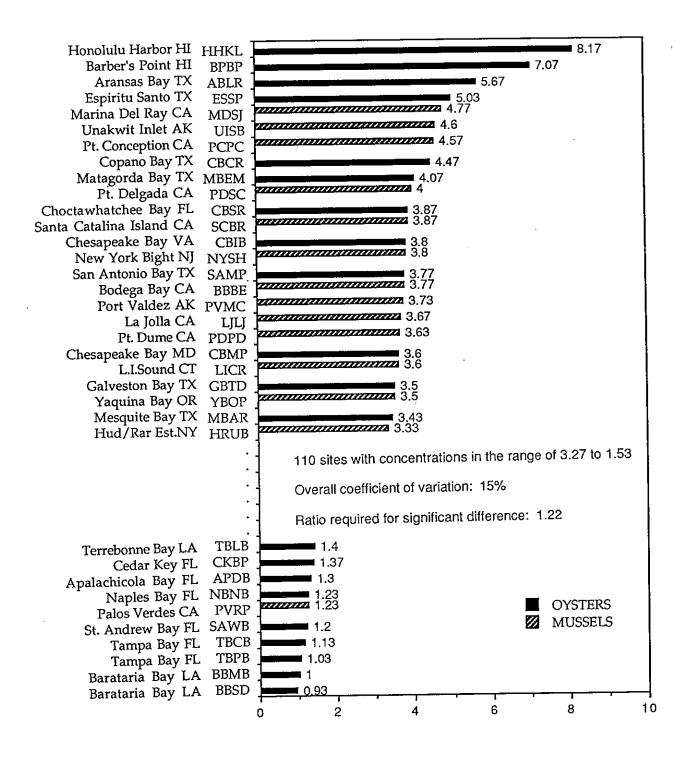
Hg ppm (μg/g) dry weight

Nickel in Bivalve Tissue



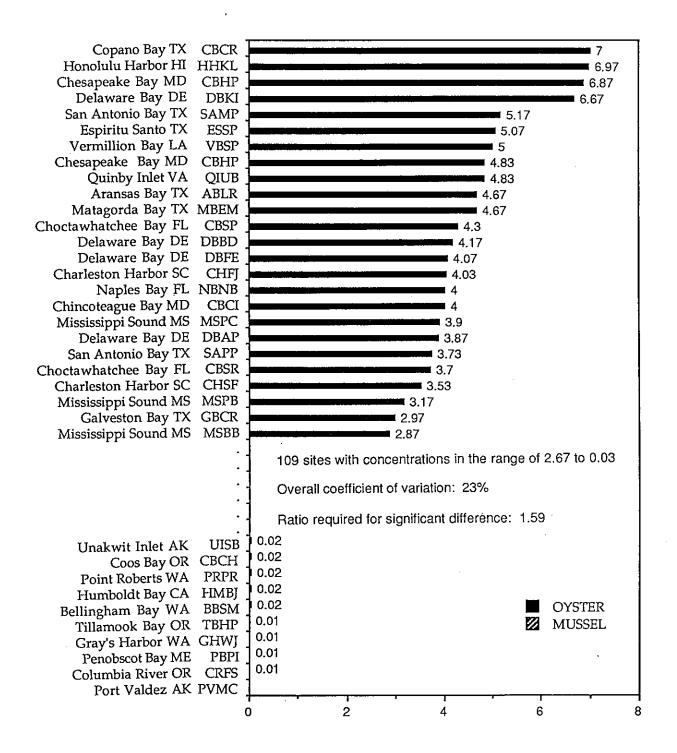
Ni ppm (μg/g) dry weight

Selenium in Bivalve Tissue



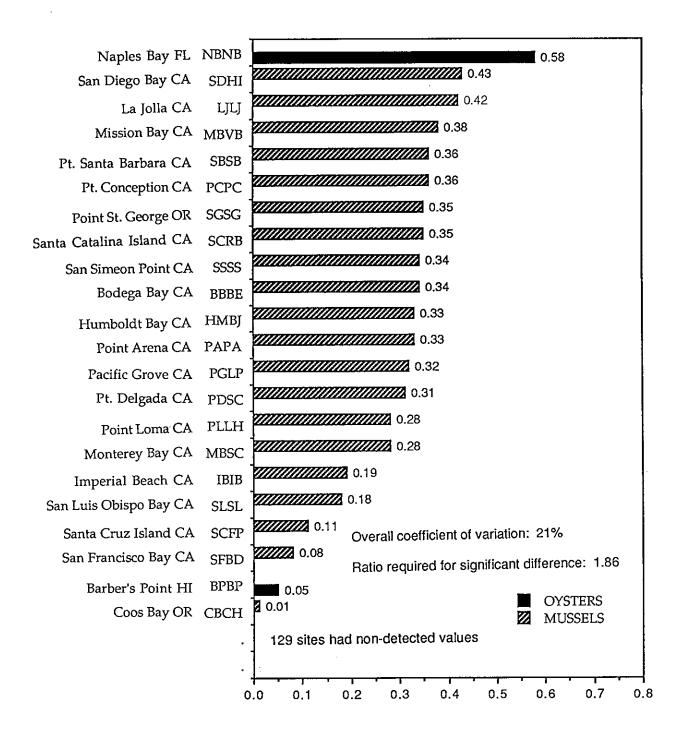
Se ppm (µg/g) dry weight

Silver in Bivalve Tissue



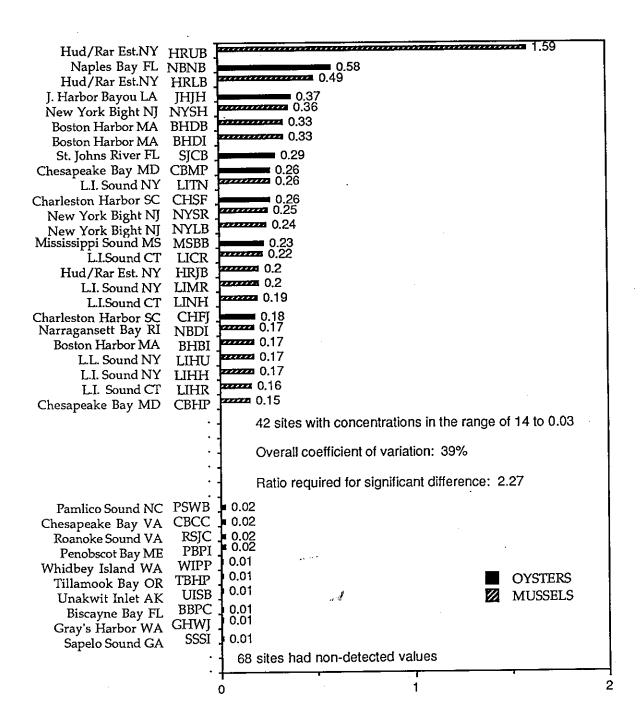
Ag ppm (µg/g) dry weight

Thallium in Bivalve Tissue



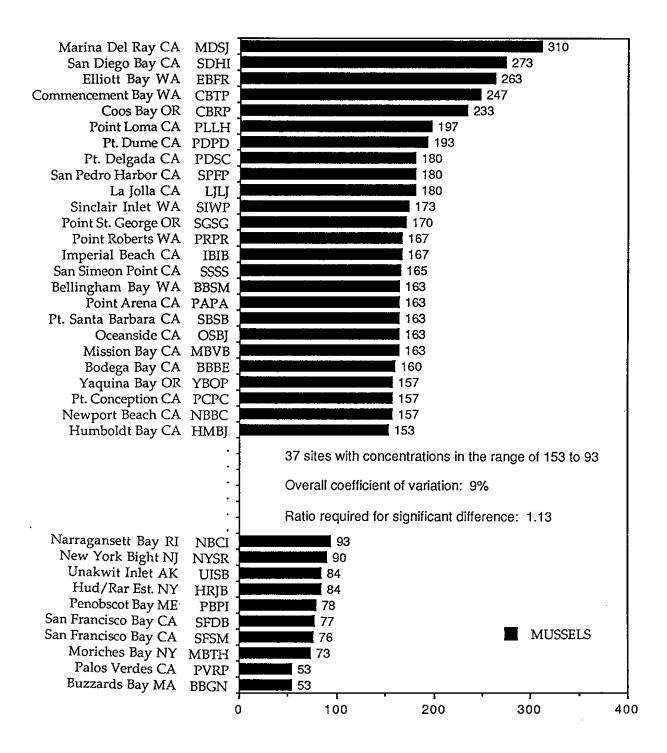
Tl ppm (μg/g) dry weight

Tin in Bivalve Tissue



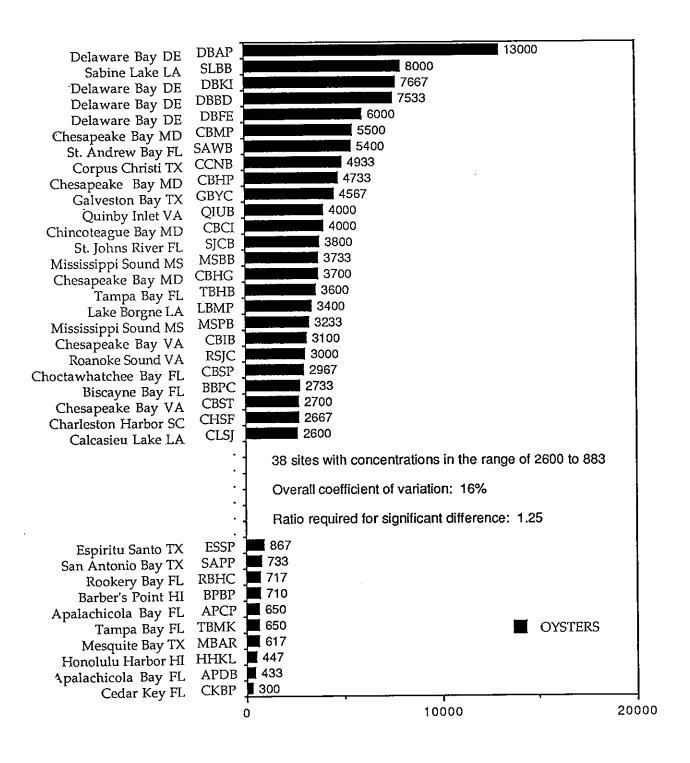
Sn ppm (μ g/g) dry weight

Zinc in Bivalve (Mussels) Tissue



Zn ppm (µg/g) dry weight

Zinc in Bivalve (Oysters) Tissue



Zn ppm (µg/g) dry weight



APPENDIX C. RANKED CONTAMINANT CONCENTRATIONS IN FISH LIVERS

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APPENDIX C. RANKED CONTAMINANT CONCENTRATIONS IN FISH LIVERS

National Status and Trends Program

Plots of Ranked Contaminant Concentrations Observed in Fish Livers Collected in 1984

Sequence of Plots by Contaminant

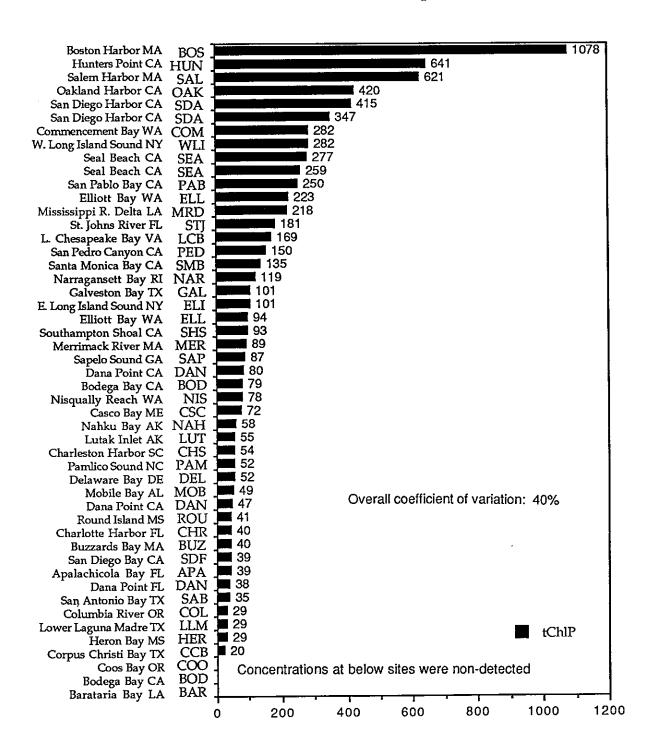
Total (non-DDT) Pesticides	C -1
Total DDT	C -2
Total Polychlorinated Biphenyls	C -3
Antimony	C -4
Arsenic	C -5
Cadmium	C -6
Chromium	C -7
Copper	C -8
Lead	C -9
Mercury	C-10
Nickel	C-11
Selenium	C-12
Silver	C-13
Thallium	C-14
Tin	C-15
Zinc	C-16

At four sites, San Diego Harbor (SDA), Seal Beach (SEA), Bodega Bay (BOD), and Elliott Bay (ELL), livers from two species were collected and analyzed for organic contaminants. For each contaminant the mean value for the site that was used in these rankings is the mean of the two species. The mean concentrations for the individual species appear in Appendix II.

At one site, Dana Point (DAN), livers from three species were collected and analyzed for all organic contaminants and all elements. For each contaminant the mean value for the site that was used in these rankings is the mean among all three species. The mean concentrations for the individual species appear in Appendix II.

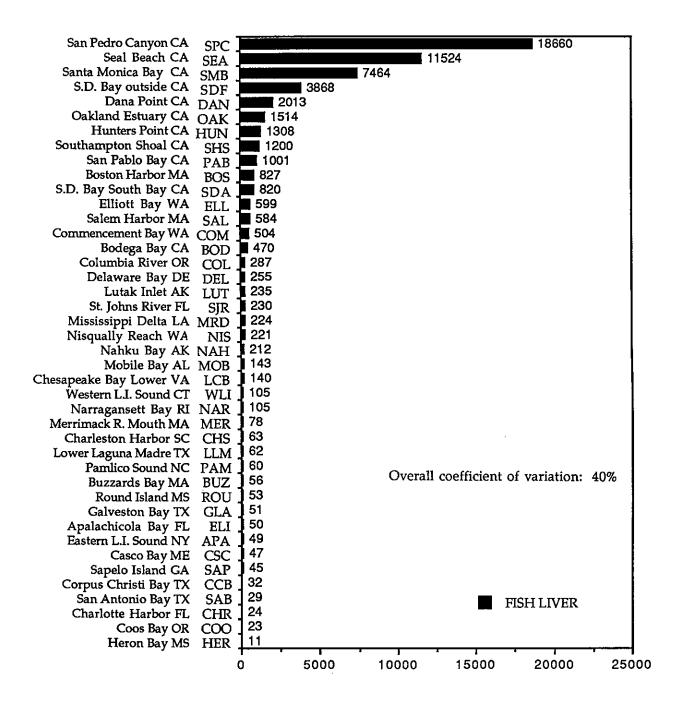


tChlP in Fish Liver Tissue



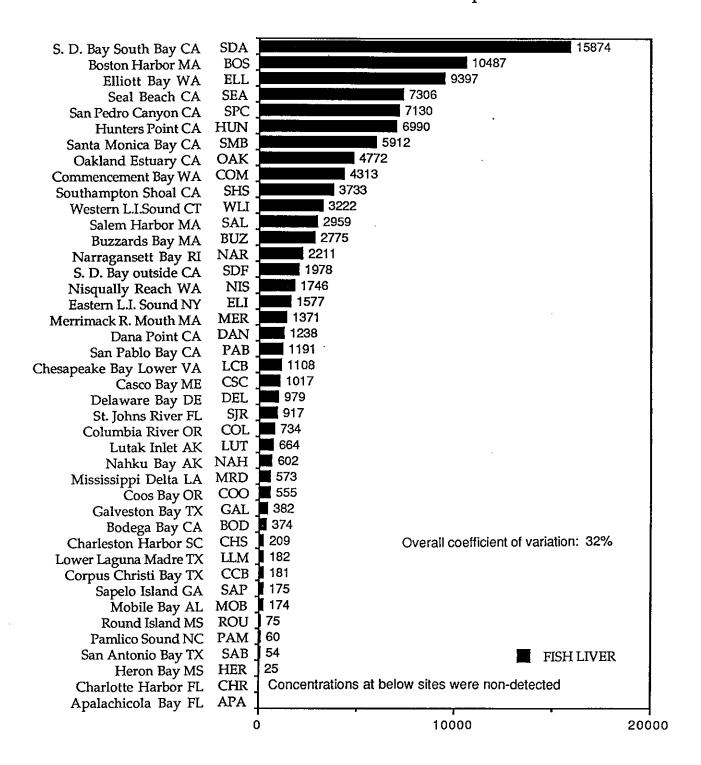
tChlP ppb (ng/g) dry weight

DDTs in Fish Liver Tissue

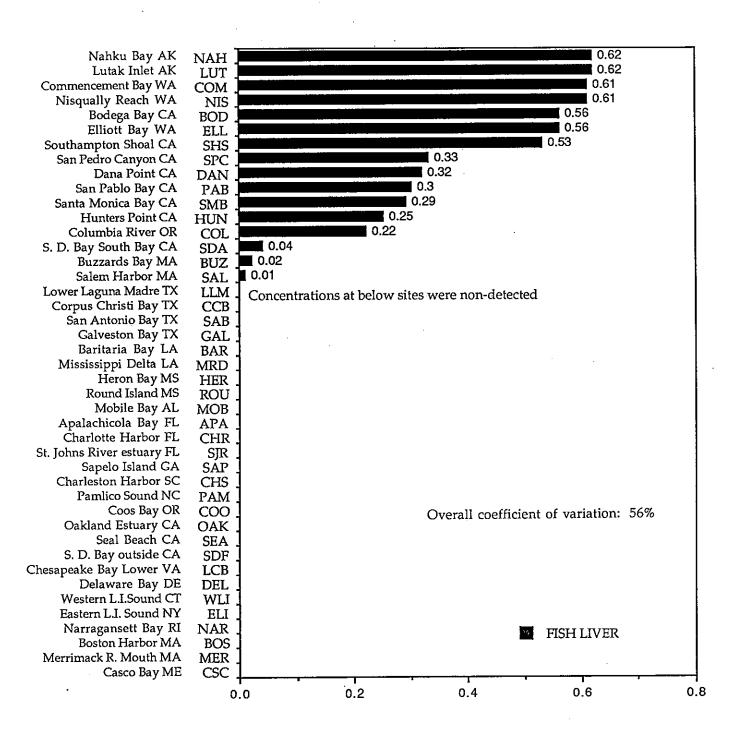


DDTs ppb (ng/g) dry weight

PCBs in Fish Liver Tissue

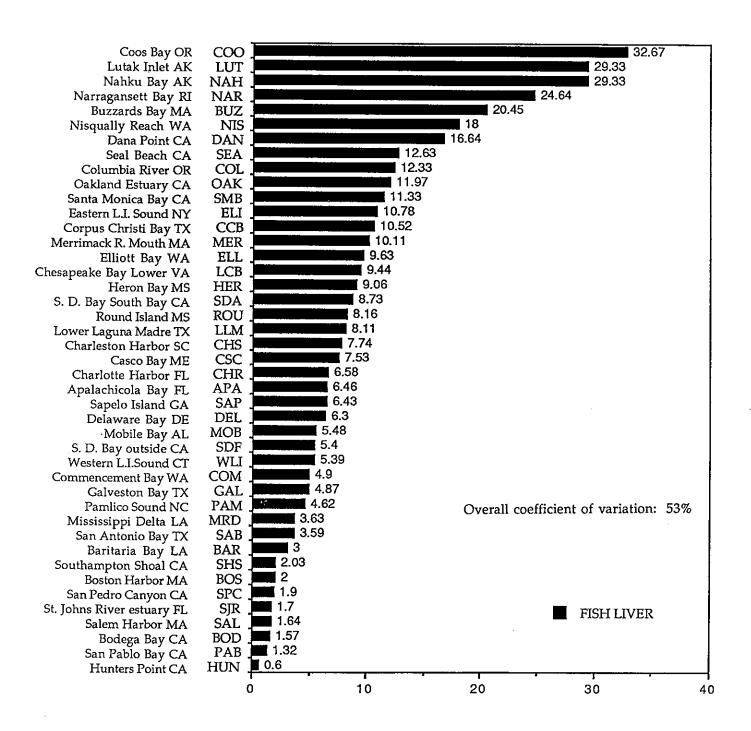


Antimony in Fish Liver Tissue



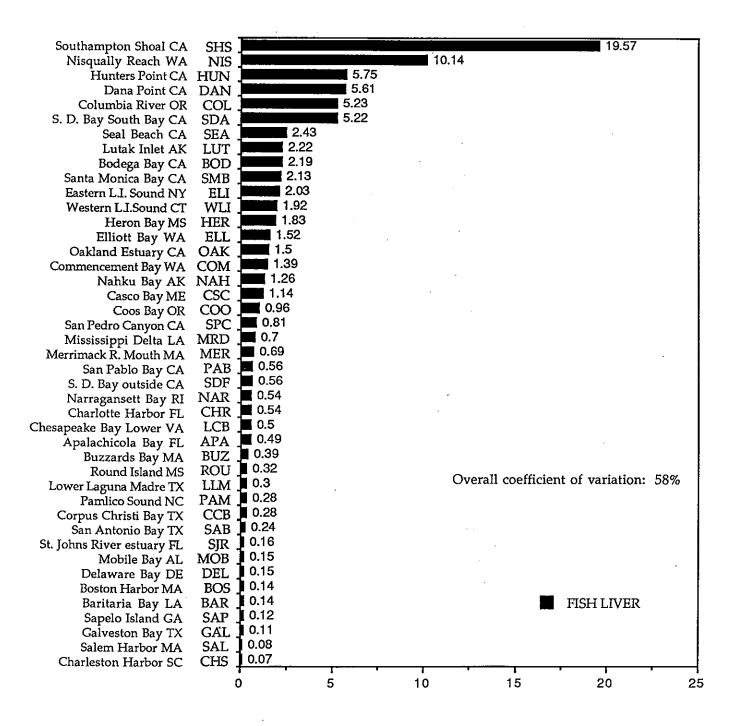
Sb ppm (µg/g) dry weight

Arsenic in Fish Liver Tissue



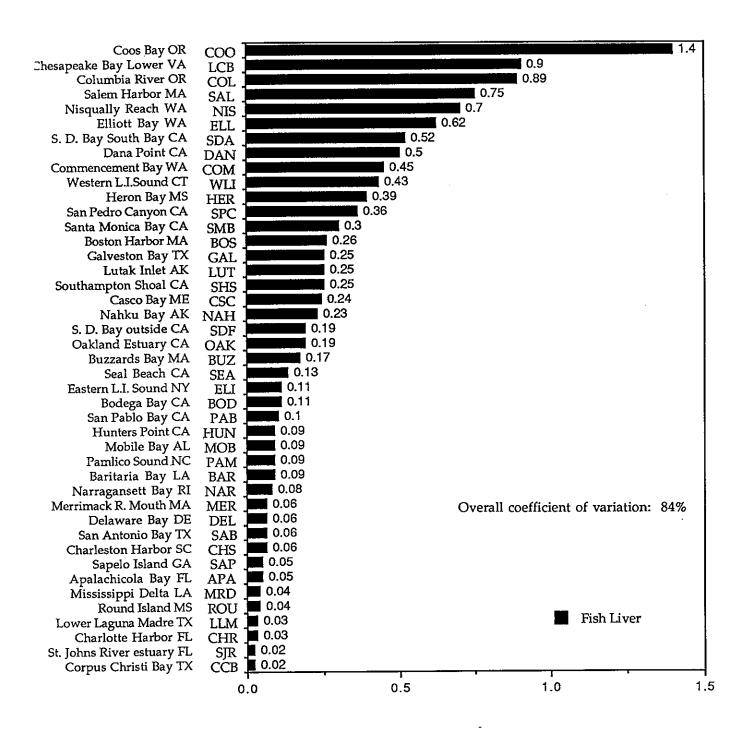
As ppm (µg/g) dry weight

Cadmium in Fish Liver Tissue



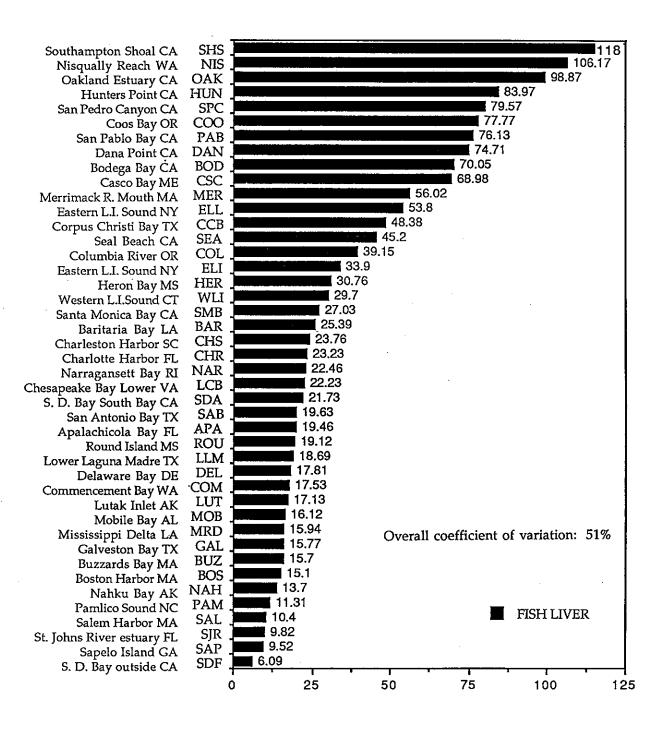
Cadmium in Fish Liver Tissue

Chromium in Fish Liver Tissue



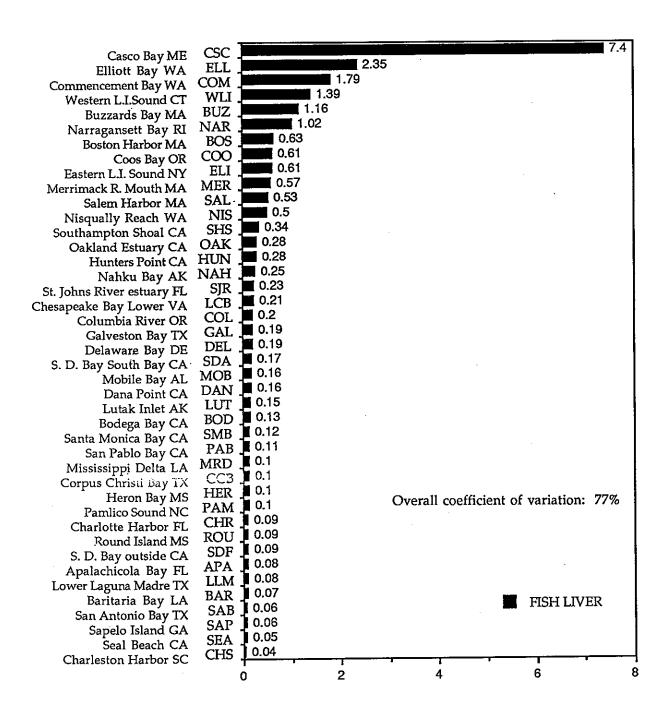
Cr ppm (μ g/g) dry weight

Copper in Fish Liver Tissue



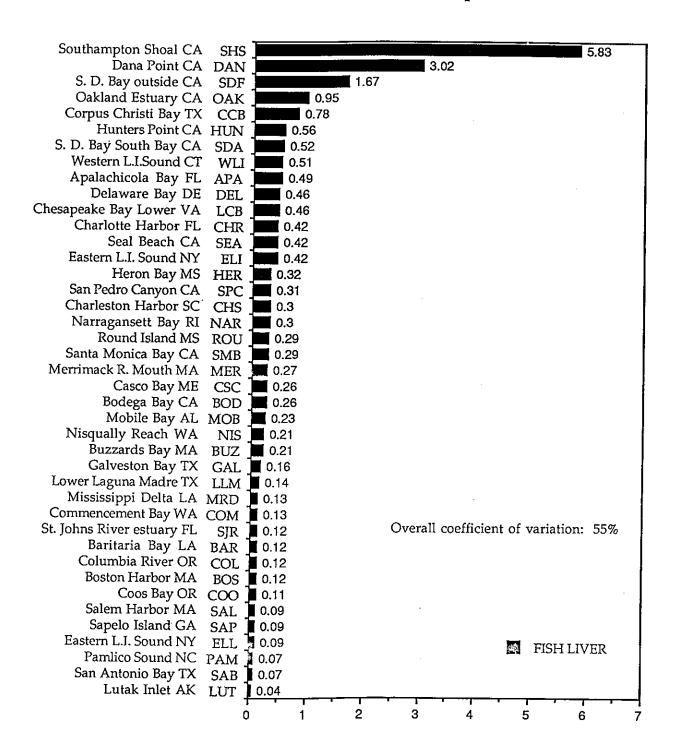
Cu ppm (µg/g) dry weight

Lead in Fish Liver Tissue



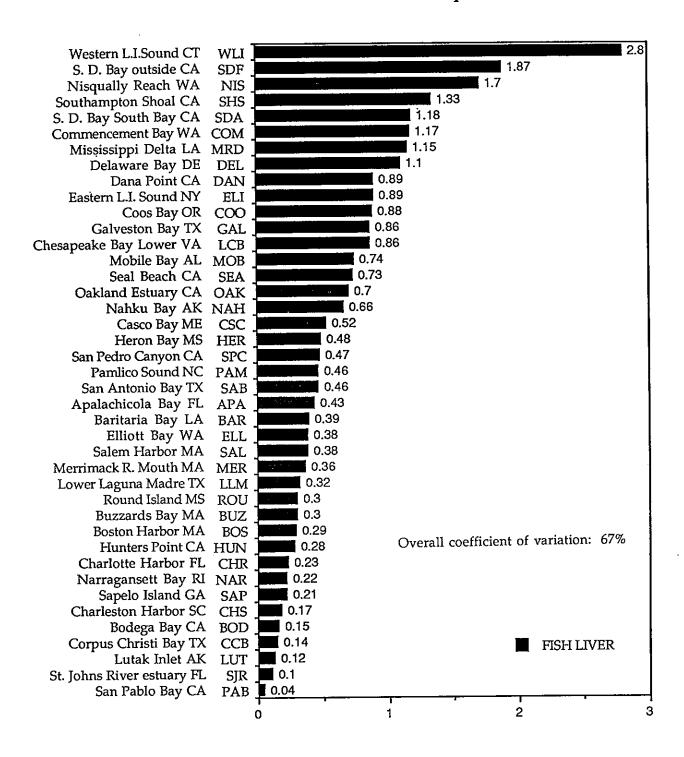
Pb ppm (μg/g) dry weight

Mercury in Fish Liver Tissue



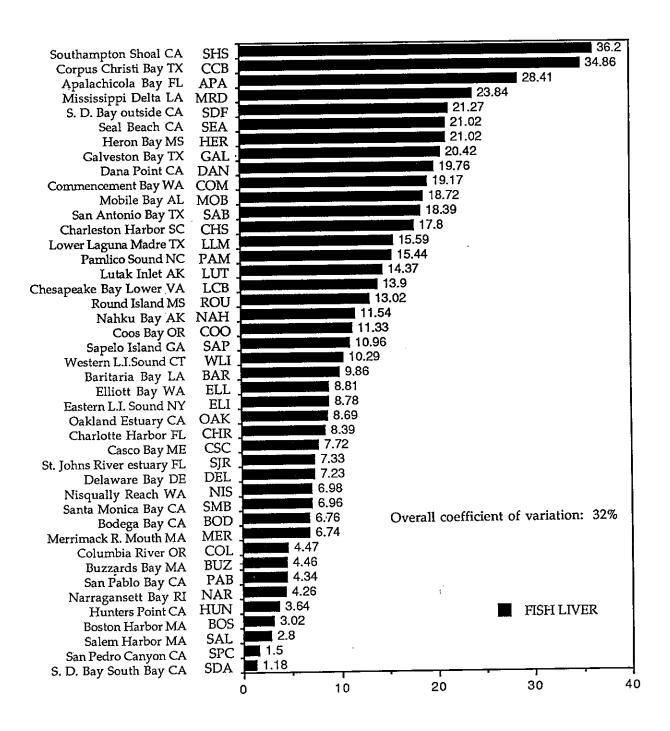
Hg ppm (μg/g) dry weight

Nickel in Fish Liver Tissue



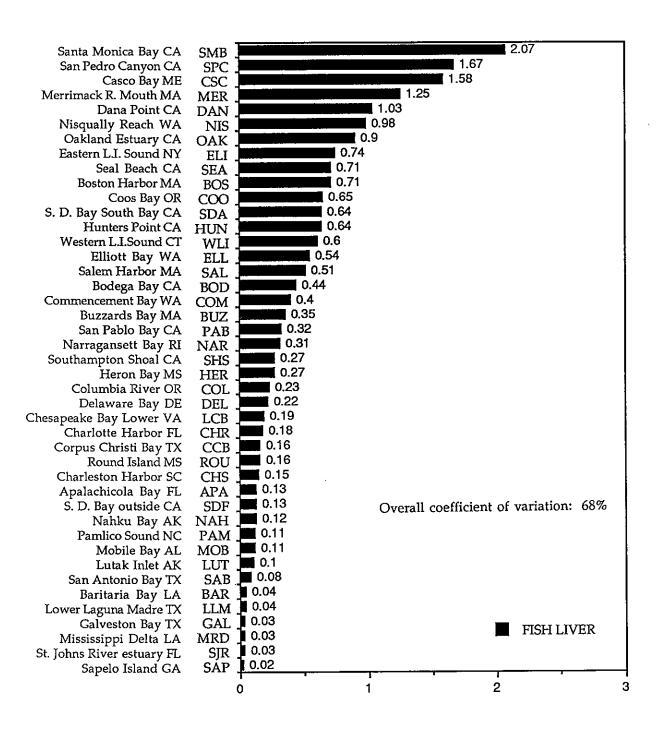
Ni ppm (μg/g) dry weight

Selenium in Fish Liver Tissue



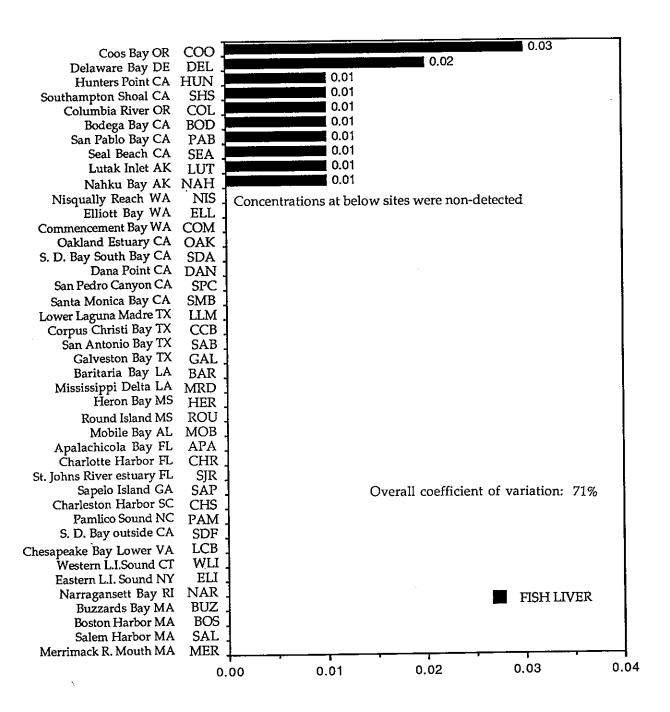
Se ppm ($\mu g/g$) dry weight

Silver in Fish Liver Tissue



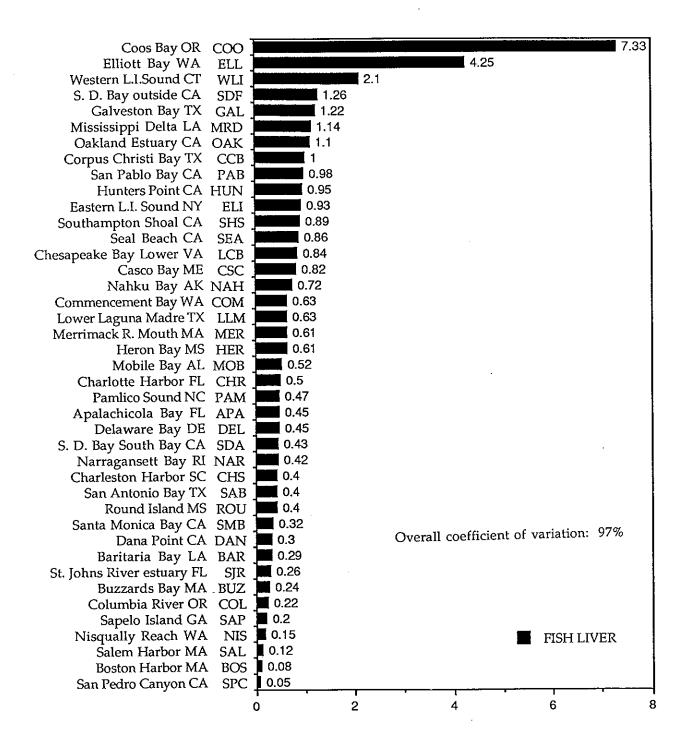
Ag ppm (μg/g) dry weight

Thallium in Fish Liver Tissue



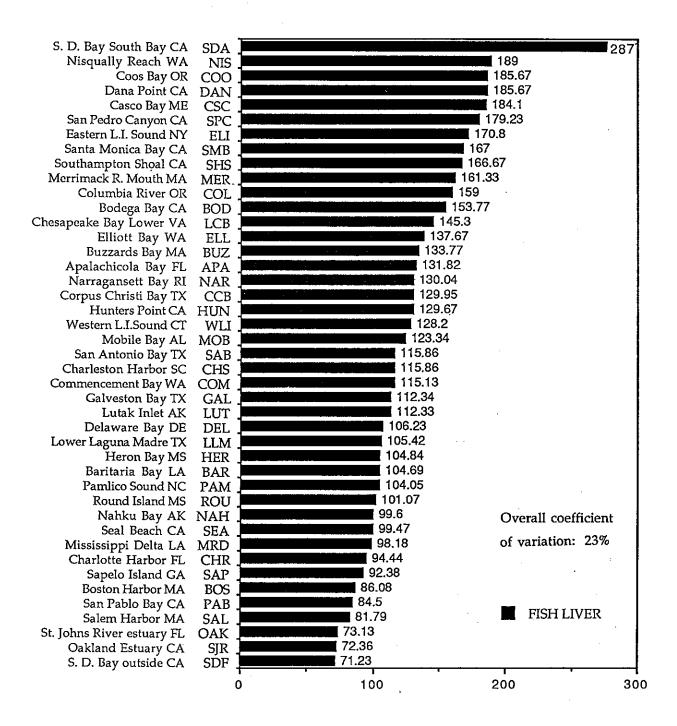
Tl ppm ($\mu g/g$) dry weight

Tin in Fish Liver Tissue



Sn ppm (µg/g) dry weight

Zinc in Fish Liver Tissue



Zn ppm (µg/g) dry weight

APPENDIX D. MUSSEL WATCH BIVALVE DATA

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APPENDIX D. MUSSEL WATCH BIVALVE DATA

National Status and Trends Program

Mussel Watch Bivalve Data From Samples Collected in 1986

Explanation of tables:

The column labeled "CODE" indicates site location more specifically than does the column labeled "Location" and is keyed to the maps showing site location.

The column labeled "species" indicates two mussel species as "med" for Mytilus edulis and mea for Mytilus califorianus and indicates two oyster species as cvi for Crassostrea virginica and osa for Ostrea sandwichensis (only sampled at the two Hawaiian sites).

Each column of mean concentrations is followed by a column labeled "c.v.%". That symbol represents the coefficient of variation and is the standard deviation calculated for that concentration at that site divided by the mean. That ratio is then multiplied by 100 to yield a percentage value. No c.v.% is shown if a mean is not calculated from concentrations found in three samples at the site (n is never greater than 3). If two of three values are nd's, indicating none detected, again no c.v.% is shown. Since the absence of a c.v.% does not necessarily mean that there were not three separate determinations at a site, the number of samples per site are listed here:

All Metals:

Three samples at 142 sites

Two samples at 3 sites: BBGN,PVRP,and MBSC

tDDT and tChIP: Three samples at 138 sites. Two samples at 7

sites;BBRH,LIHR,NYSR,CHFJ,SRTI,SIWP,PRPR

tPCB:

Three samples at 137 sites. Two samples at 8

sites;BBRH,LIHR,NYSR,CHFJ,SRTI,IBIB,SIWP,PRPR

tPAH:

Three samples at 139 sites. Two samples at 6

sites;CHFJ,MRCB,SAMP,LMSB,SIWP,PRPR



Concentrations (ng/g dry weight) of total non-DDT chlorinated pesticides ,tChIP,and total DDT, tDDT,in bivalves collected during 1986 at East Coast Sites

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Location	Code Species	tChIP	c.v.%	tDDT	c.v.%
Penobscot Bay ME	PBSI med	28	1	24	43
Penobscot Bay ME	PBPI med	2	112	3	86
Boston Harbor MA	BHDI med	143	13	127	26
Boston Harbor MA	BHDB med	107	23	79	100
Boston Harbor MA	BHHB med	78	12	63	63
Boston Harbor MA	BHBI med	67	23	84	38
Buzzards Bay MA	BBRH med	69		40	
Buzzards Bay MA	BBAR med	140	22	269	34
Buzzards Bay MA	BBGN med	43	73	93	107
Narragansett Bay RI	NBCI med	46	16	31	9
	NBDI med	11	127	8	130
Narragansett Bay RI		28	9	58	45
Long Island Sound CT					40 40
Long Island Sound CT	LINH med	114	31	110	40
Long Island Sound CT	LIHR med	69	00	37	
Long Island Sound CT	LISI med	80	36	96	41
Long Island Sound NY	LIMR med	109	36	151	39
Long Island Sound NY	LIHH med	76	42	131	39
Long Island Sound NY	LITN med	120	11	218	19
Long Island Sound NY	LIHU med	70	21	44	40
Long Island Sound NY	LIPJ med	35	19	31	48
Moriches Bay NY	MBTH med	36	9	62	11
Hud/Rar Estuary NY	HRJB med	109	16	173	2
Hud/Rar Estuary NY	HRUB med	136	26	192	26
Hud/Rar Estuary NY	HRLB med	438	6	1109	15
New York Bight NJ	NYSH med	192	6	272	23
New York Bight NJ	NYLB med	94	3	133	23
New York Bight NJ	NYSR med	294		156	
Delaware Bay DE	DBFE cvi	47	21	115	25
Delaware Bay DE	DBBD cvi	62	71	169	36
Delaware Bay DE	DBAP cvi	41	52	99	76
Delaware Bay DE	DBKI cvi	47	33	131	22
Chincoteague Bay MD	CBCI cvi	23	73	22	27
Quinby Inlet VA	QIUB cvi	8	47	23	68
Chesapeake Bay MD	CBMP cvi	101	35	98	28
Chesapeake Bay MD	CBHP cvi	55	20	68	35
Chesapeake Bay MD	CBHG cvi	33	16	85	20
		33 37	42	25	79
Chesapeake Bay VA	CBIB cvi	35	13	190	52
Chesapeake Bay VA	CBCC cvi				
Chesapeake Bay VA	CBST cvi	45	70	65	8
Roanoke Sound VA	RSJC cvi	11	69	9	82
Pamlico Sound NC	PSWB cvi	9	78 50	5	110
Cape Fear NC	CFBI cvi	8	59	4	
Charleston Harbor SC	CHFJ cvi	30		19	
Charleston Harbor SC	CHSF cvi	34	44	17	102
Savannah R.Est. GA	SRTI cvi	18		8	
Sapelo Sound GA	SSSI cvi	16	88	_8	102
St. Johns River FL	SJCB cvi	47	112	51	161
Matanzas River FL	MRCB cvi	3	138	2	118
Biscayne Bay FL	BBPC cvi	9	114	6	118

Concentrations (ng/g dry weight) of total non-DDT chlorinated pesticides ,tChIP,and total DDT, tDDT, in bivalves collected during 1986 at Gulf Coast Sites

Location	Code	Species	tChiP	c.v.%	tDDT	c.v.%
Everglades FL	EVFU	cvi	2	33	2	18
Rookery Bay FL	RBHC	CVİ	5	57	5	32
Naples Bay FL	NBNB	cvi	117	24	10	9
Charlotte Harbor FL	CBBI	cvi	11	25	18	40
Tampa Bay FL	TBMK	cvi	27	13	26	6 9
Tampa Bay FL	TBCB	cvi	89	25	45	34
Tampa Bay FL	TBHB	cvi	28	23	50	25
Tampa Bay FL	TBPB	CVI	79.	20	20	21
Cedar Key FL	CKBP	cvi	14	44	12	18
Apalachicola Bay FL	APCP	cvi	19	14	37	20
Apalachicola Bay FL	APDB	cvi	14	15	32	3
St. Andrew Bay FL	SAWB	cvi	104	34	191	41
Choctawhatchee Bay FL	CBSP	cvi	67	34	302	30
Choctawhatchee Bay FL	CBSR	cvi	14	32	47	30
Pensacola Bay FL	PBIB	cvi	22	12	67	55
Mobile Bay AL	MBCP	cvi	26	36	152	37
Mississippi Sound MS	MSPB	. cvi	23	34	23	33
Mississippi Sound MS	MSBB	cvi	133	63	112	30
Mississippi Sound MS	MSPC	cvi	30	12	18	20
Lake Borgne LA	L.BMP	cvi	20	54	19	42
Breton Sound LA	BSSI	cvi	89	37	72	45
Breton Sound LA	BSBG	cvi	17	57	23	9 7
Barataria Bay LA	BBSD	cvi	19	19	13	15
Barataria Bay LA	ВВМВ	cvi	50	59	16	69
Terrebonne Bay LA	TBLF	cvi	9	28	6	13
Terrebonne Bay LA	TBLB	cvi	9	53	8	67
Caillou Lake LA	CLCL	cvi	14	16	17	12
Atchafalaya Bay LA	ABOB	cvi	28	15	48	9
Vermillion Bay LA	VBSP	cvi	34	14	5 6	8
Joseph Hrb. Bayou LA	JHJH	cvi	27	29	44	34
Calcasieu Lake LA	CLSJ	cvi	27	15	27	24
Sabine Lake LA	SLBB	cvi	19	35	19	44
Galveston Bay TX	GBHR	cvi	22	18	10	16
Galveston Bay TX	GBYC	cvi	167	17	153	9
Galveston Bay TX	GBTD	cvi	42	20	33	28
Galveston Bay TX	GBCR	cvi	19	17	15	22
Matagorda Bay TX	MBEM	cvi	24	63	33	55
Matagorda Bay TX	MBTP	cvi	22	71	93	88
Matagorda Bay TX	MBGP	, cvi	10	3	38	9
Matagorda Bay TX	MBLR	cvi	24	31	50	34
Espiritu Santo TX	ESSP	cvi	9	36	10	16
San Antonio Bay TX	SAMP	cvi	19	20	26	19
San Antonio Bay TX	SAPP	cvi	14	35	12	27
Mesquite Bay TX	MBAR	cvi	15	40	15	49
Copano Bay TX	CBCR	cvi	11	30	39	29
Aransas Bay TX	ABLR	cvi	14	32	12	3
Corpus Christi TX	CCIC	cvi	47	12	23	8
Corpus Christi TX	CCNB	cvi	 27	64	31	37
Lower Laguna Madre TX	LMSB	cvi	4	19	14	15
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Concentrations (ng/g dry weight) of total non-DDT chlorinated pesticides ,tChIP,and total DDT, tDDT,in bivalves collected during 1986 at West Coast Sites

Location	Code Si	secies	tChIP	c.v.%	tDDT	c.v.%
Imperial Beach CA	IBIB	mca	27	2	264	14
San Diego Bay CA	SDHI	med	32	55	108	55
Point Loma CA	PLLH	mca	26	36	134	36
Mission Bay CA		med/ca	40	51	69	2
La Jolla CA	LJLJ	mca	54	13	37	56
Oceanside CA	OSBJ	med	11	73	64	52
Newport Beach CA	NBBC	mca	10	49	78	63
Anaheim Bay CA	ABWJ	mca	93	27	357	43
San Pedro Harbor CA	SPFP	med	33	30	1077	39
Palos Verdes CA	PVRP	mca	32	70	1061	73
Santa Cruz Island CA	SCFP	mca	8	59	16	54
Marina Del Ray CA	MDSJ	med	75	36	125	31
Pt. Dume CA	PDPD	mca	18	74	155	62
Santa Catalina Island CA	SCBR	mca	6	33	21	29
Pt. Santa Barbara CA	SBSB	mca	11	18	40	5
Pt. Conception CA	PCPC	mca	12	105	33	48
San Luis Obispo Bay CA		mca	36	78	186	66
San Simeon Point CA	SSSS	mca	9	78	25	2
Pacific Grove CA	PGLP	mca	41	11	46	23
	MBSC		56	16	148	51
Monterey Bay CA	SFDB	mca	252	62	324	62
San Francisco Bay CA	SFSM	med	110	81	128	47
San Francisco Bay CA	TBSR	med	5	106	9	54
Tomales Bay CA	BBBE	med	39	14	2 7	32
Bodega Bay CA		mca	14	24	17	5
Point Arena CA	PAPA	mca		2 4 27	5	66
Pt. Delgada CA	PDSC	mca	30		11	49
Humboldt Bay CA	HMBJ	mca	5	17 13	9	20
Point St. George OR	SGSG	mca	20			23
Coos Bay OR	CBCH	mca	19	13	24	
Coos Bay OR	CBRP	med	10	43	9	29
Yaquina Bay OR	YBOP	med	5	59	8	16
Yaquina Head OR	YHYH	mca	4	27	6	41
Tillamook Bay OR	TBHP	med	5	2	7	3
Columbia River OR	CRSJ	med	14	14	74	17
Gray's Harbor WA	GHWJ	mca	19	23	21	27
Str. of Juan de Fuca WA		mca	15	84	11	96
South Puget Sound WA	SSBI	med	13	17	14	3
Commencem.Bay WA	CBTP	med	20	17	33	36
Elliott Bay WA	EBFR	med	39	27	130	32
Sinclair Inlet WA	SIWP	med	. 9		17	
Whidbey Island WA	WIPP	med	12	26	21	50
Bellingham Bay WA	BBSM		10	36	20	29
Point Roberts WA	PRPR	med	7		27	
Unakwit Inlet AK	UISB	med	6	10	5	74
Port Valdez AK	PVMC		4	18	_3	22
Barber's Point HI	BPBP	osa	91	44	53	41
Honolulu Harbor Hl	HHKL	osa	4	77	7	78

Concentrations (ng/g dry weight) of total polychlorinated biphenyls, tPCB, and total polyaromatic hyrocarbons, tPAH, in bivalves collected during 1986 at East Coast Sites

Location	Code	Species	tPCB	c.v.%	tPAH	c.v.%
Penobscot Bay ME	PBSI	med	217	42	837	30
Penobscot Bay ME	PBPI	med	52	47	731	71
Boston Harbor MA	BHDI	med	1354	14	4267	24
Boston Harbor MA	BHDB	med	1684	52	5895	64
Boston Harbor MA	BHHB	med	1015	19	5440	60
Boston Harbor MA	BHBI	med	542	5	1514	36
Buzzards Bay MA	BBRH	med	1482		1642	62
Buzzards Bay MA	BBAR	med	6808	24	1060	16
Buzzards Bay MA	BBGN	med	1617	8	281	94
Narragansett Bay RI	NBCI	med	214	44	275	17
Narragansett Bay RI	NBDI	med	208	58	354	29
Long Island Sound CT	LICR	med	467	2	789	81
Long Island Sound CT	LINH	med	958	15	818	26
Long Island Sound CT	LIHR	med	726		246	53
Long Island Sound CT	LISI	med	850	12	625	28
Long Island Sound NY	LIMR	med	951	42	891	20
Long Island Sound NY	LIHH	med	606	29	1801	12
Long Island Sound NY	LITN	med	1433	17	5266	66
Long Island Sound NY	LIHU	med	597	23	3250	16 9
Long Island Sound NY	LIPJ	med	380	27	903	56
Moriches Bay NY	MBTH	med	237	8	nd	
Hud/Rar Estuary NY	HRJB	med	991	8	3159	7
Hud/Rar Estuary NY	HRUB	med	3317	22	20174	4
Hud/Rar Estuary NY	HRLB	med	4254	21	3266	27
New York Bight NJ	NYSH	med	1814	16	2550	24
New York Bight NJ	NYLB	med	774	17	1953	23
New York Bight NJ	NY\$R	med	4161		1305	6
Delaware Bay DE	DBFE	cvi	397	4	928	69
Delaware Bay DE	DBBD	cvi	433	73	562	45
Delaware Bay DE	DBAP	cvi	567	54	439	144
Delaware Bay DE	DBKI	cvi	563	30	1470	65
Chincoteague Bay MD	CBCI	cvi	89	83	516	48
Quinby Inlet VA	QIUB	cvi	78	19	437	49
Chesapeake Bay MD	CBMP	cvi	431	34	nd	
Chesapeake Bay MD	CBHP	cvi	333	34	535	84
Chesapeake Bay MD	CBHG	cvi	154	34	1126	21
Chesapeake Bay VA	CBIB	cvi	82	31	102	
Chesapeake Bay VA	CBCC	cvi	78	29	673	58
Chesapeake Bay VA	CBST	cvi	233	10	280	
Roanoke Sound VA	RSJC	cvi	29	25	631	70
Pamlico Sound NC	PSWB	cvi	23	57	1081	52
Cape Fear NC	CFBI	cvi	22	80	2190	80
Charleston Harbor SC	CHFJ	cvi	116		1828	
Charleston Harbor SC	CHSF	cvi	162	21	2670	45
Savannah R.Est.GA	SRTI	cvi	62		729	26
Sapelo Sound GA	SSSI	cvi	55	54	80	87
St. Johns River FL	SJCB	cvi	376	75	261	36
Matanzas River FL	MRCB	cvi	56	95	227	
Biscayne Bay FL	BBPC	cvi	9	100	381	120

Concentrations (ng/g dry weight) of total polychlorinated biphenyls, tPCB, and total polyaromatic hyrocarbons, tPAH, in bivalves collected during 1986 at Gulf Coast Sites

Location	Code	Species	tPCB	c.v.%	tPAH	c.v.%
Everglades FL	EVFU	cvi	27	41	98	36
Rookery Bay FL	RBHC	cvi	26	47	32	86
Naples Bay FL	NBNB	cvi	77	44	257	34
Charlotte Harbor FL	CBBI	cvi	130	94	7	
Tampa Bay FL	TBMK	cvi	50	20	92	13
Tampa Bay FL	TBCB	cvi	45	24	nd	_
Tampa Bay FL	TBHB	cvi	302	36	480	13
Tampa Bay FL	TBPB	cvi	174	40	91	13
Cedar Key FL	CKBP	cvi	41	63	38	73
Apalachicola Bay FL	APCP	cvi	73	33	135	71
Apalachicola Bay FL	APDB	cvi	62	32	nd	
St. Andrew Bay FL	SAWB	cvi	890	30	13277	36
Choctawhatchee Bay FL	CBSP	cvi	177	68	404	27
Choctawhatchee Bay FL	CBSR	cvi	37	13	221	83
Pensacola Bay FL	PBIB	cvi	626	36	435	14
Mobile Bay AL	MBCP	cvi	174	66	72	102
Mississippi Sound MS	MSPB	cvi	195	57	242	2
Mississippi Sound MS	MSBB	cvi ·	382	16	1518	16
Mississippi Sound MS	MSPC	cvi	58	9	284	128
Lake Borgne LA	LBMP	cvi	102	49	60	
Breton Sound LA	BSSI	cvi	356	42	146	50
Breton Sound LA	BSBG	cvi	101	88	284	29
Barataria Bay LA	BBSD	cvi	59	10	53	96
Barataria Bay LA	BBMB	cvi	210	63	1109	61
Terrebonne Bay LA	TBLF	cvi	44	11	773	170
Terrebonne Bay LA	TBLB	cvi	69	66	45	
Caillou Lake LA	CLCL	cvi	67	14	20	
Atchafalaya Bay LA	ABOB	cvi	128	8	705	166
Vermillion Bay LA	VBSP	cvi	143	9	68	46
Joseph Hrb. Bayou LA	JHJH	cvi	105	26	41	35
Calcasieu Lake LA	CLSJ	cvi	145	12	385	4
Sabine Lake LA	SLBB	cvi	145	43	219	26
Galveston Bay TX	GBHR	cvi	52	14	21	86
Galveston Bay TX	GBYC	cvi	1952	93	1022	14
Galveston Bay TX	GBTD	cvi	140	23	118	69
Galveston Bay TX	GBCR	cvi	122	20	1120	21
Matagorda Bay TX	MBEM	cvi	100	69	84	103
Matagorda Bay TX	MBTP	cvi	92	73	15	
Matagorda Bay TX	MBGP	cvi	97	28	13	
Matagorda Bay TX	MBLR	cvi	175	32	90	40
Espiritu Santo TX	ESSP	cvi	13	22	15	
San Antonio Bay TX	SAMP	cvi	28	75	93	
San Antonio Bay TX	SAPP	cvi	31	29	37	91
Mesquite Bay TX	MBAR	cvi	40	51	56	141
Copano Bay TX	CBCR	cvi	67	18	44	132
Aransas Bay TX	ABLR	cvi	36	18	32	
Corpus Christi TX	CCIC	cvi	112	57	1072	11
Corpus Christi TX	CCNB	cvi	107	28	62	60
Lower Laguna Madre TX	LMSB	cvi	68	31	14	
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Concentrations (ng/g dry weight) of total polychlorinated biphenyls, tPCB, and total polyaromatic hyrocarbons, tPAH, in bivalves collected during 1986 at West Coast Sites

Location	Code	Species	tPCB	c.v.%	tPAH	c.v.%
Imperial Beach CA	IBIB	mca	183		140	
San Diego Bay CA	SDHI	med	2052	43	4392	54
Point Loma CA	PLLH	mca	376	18	2953	77
Mission Bay CA	MBVB	med/ca.	607	34	803	76
La Jolla CA	LJLJ	mca	655	13	nd	
Oceanside CA	OSBJ	med	63	57	nd	
Newport Beach CA	NBBC	mca	146	41	nd	
Anaheim Bay CA	ABWJ	mca	326	43	nd	
San Pedro Harbor CA	SPFP	med	530	45	1933	98
Palos Verdes CA	PVRP	mca	332	39	nd	
Santa Cruz Island CA	SCFP	mca	138	83	2835	44
Marina Del Ray CA	MDSJ	med	213	31	1193	42
Pt. Dume CA	PDPD	mca	178	22	26	
Santa Catalina Island CA	SCBR	mca	114	23	1851	43
Pt. Santa Barbara CA	SBSB	mca	69	12	176	119
Pt. Conception CA	PCPC	mca	135	68	56	
San Luis Óbispo Bay CA	SLSL	mca	130	20	1490	101
San Simeon Point CA	SSSS	mca	113	17	2008	13
Pacific Grove CA	PGLP	mca	99	53	376	
Monterey Bay CA	MBSC	mca	82	43	16	
San Francisco Bay CA	SFDB	med	518	40	553	15
San Francisco Bay CA	SFSM	med	676	93	1417	79
Tomales Bay CA	TBSR	me	51	41	nd	,,
Bodega Bay CA	BBBE	mca	209	15	438	158
Point Arena CA	PAPA	mca	66	17	85	
Pt. Delgada CA	PDSC	mca	165	71	410	
Humboldt Bay CA	HMBJ	mca	40	55	730	109
Point St. George OR	SGSG	mca	131	14	2540	46
Coos Bay OR	CBCH	mca	149	17	3077	32
Coos Bay OR	CBRP	med	276	14	4143	30
Yaquina Bay OR	YBOP	med	91	17	3466	124
Yaquina Head OR	YHYH	mca	67	47	87	104
Tillamook Bay OR	TBHP	med	112	26	246	130
Columbia River OR	CRSJ	med	85	12	97	22
Gray's Harbor WA	GHWJ	mca	90	15	nd	
Str. of Juan de Fuca WA	JFCF	mca	59	84	976	150
South Puget Sound WA	SSBI	med	131	2	2190	32
Commencement Bay WA	CBTP	med	193	19	2356	27
Elliott Bay WA	EBFR	med	1073	38	23236	15
Sinclair Inlet WA	SIWP	med	322	•	3025	. •
Whidbey Island WA	WIPP	med	148	34	495	41
Bellingham Bay WA	BBSM	med	112	18	1533	43
Point Roberts WA	PRPR	med	113		210	
Unakwit Inlet AK	UISB	med	54	41	40	
Port Valdez AK	PVMC	med	83	10	283	
Barber's Point HI	BPBP	osa	594	33	7573	63
Honolulu Harbor HI	HHKL	osa	125	50	36	
			. = 4			

Concentrations (ug/g dry weight) of Antimony (Sb) Arsenic (As) and Cadmium (Cd) in bivalves collected during 1986 at East Coast Sites

Location	Code	Species	Sb	c.v.%	As	c.v.%	Cd c.v.%
Penobscot Bay ME	PBSI	med	nd		8.86	6.8	1.04 13
Penobscot Bay ME	PBPI	med	nd		9.23	3.3	0.2 8.6
Boston Harbor MA	BHDI	med	nd		8.23	5.4	1.6 6.2
Boston Harbor MA	BHDB	med	nd		8.86	4.5	1.73 6.6
Boston Harbor MA	BHHB	med	nd		8.46	2.4	1.02 22.6
Boston Harbor MA	BHBI	med	nd		8.26	5.4	0.75 6.5
Buzzards Bay MA	BBRH	med	nd		13	0	1.2 8.3
Buzzards Bay MA	BBAR	med	nd		13.66	4.2	1.3 7.6
Buzzards Bay MA	BBGN	med	nd		8.33		0.65
Narragansett Bay RI	NBCI	med	nd		11.33	5	1.26 9.1
Narragansett Bay RI	NBDI	med	nd		10.53	7.6	1.9 5.2
Long Island Snd CT	LICR	med	nd		11	0	3.06 9.9
Long Island Snd CT	LINH	med	nd		6.96	4.6	2.83 20
Long Island Snd CT	LIHR	med	nd		8.83	3.6	5.73 9.9
Long Island Snd CT	LISI	med	nd		6.83	4.2	2.23 11.2
Long Island Snd NY	LIMR	med	nd		6.93	9.2	3.36 17.4
Long Island Snd NY	LIHH	med	nd		6.1	6.5	3.23 15.8
Long Island Snd NY	LITN	med	nd		6.23	17.7	4.6 4.3
Long Island Snd NY	LIHU	med	nd		6.5	4.6	2.96 7
Long Island Snd NY	LIPJ	med	nd		6.76	13.3	3.13 3.6
Moriches Bay NY	MBTH	med	nd		14.33	4	0.97 20.9
Hud/Rar Estuary NY	HRJB	med	nd		8.39	7.4	2.23 5.1
Hud/Rar Estuary NY	HRUB	med	nd		9.53	4.3	9.3 9.3
Hud/Rar Estuary NY	HRLB	med	nd		9	7.2	3.3 13.2
New York Bight NJ	NYSH	med	nd		8.8	4.5	4.23 1.3
New York Bight NJ	NYLB	med	nd		8.5	3.5	2.06 5.5
New York Bight NJ	NYSR	med	nd		8.43	3.4	2.06 5.5
Delaware Bay DE	DBFE	CVİ	nd		7.3	5.9	6.16 6.1
Delaware Bay DE	DBBD	cvi	nd		6.3	12.5	7.76 3.9
Delaware Bay DE	DBAP	cvi	nd		5.6	17	13 nd
Delaware Bay DE	DBKI	cvi	nd		8	6.6	9.96 17.9
Chesapeake Bay MD	CBMP	cvi	nd		6.53	9.3	10.5 8.2
Chesapeake Bay MD	CBHP	cvi	nd		6.66	4.5	5.66 8.3
Chesapeake Bay MD	CBHG	cvi	nd		8.1	11.7	4.69 5.6
Chesapeake Bay VA	CBIB	cvi	nd		11.33	5	2.26 2.5
Chesapeake Bay VA	CBCC	cvi	nd		16.66	6.9	1.76 3.2
Chesapeake Bay VA	CBST	cvi	nd		14.66	3.9	2.93 1.9
Chincoteague Bay VA	CBCI	cvi	nd		12.33	4.6	3.2 14.3
Quinby Inlet VA	QIUB	cvi	nd		10.26	6.2	3.16 14.9
Roanoke Sound NC	RSJC	cvi	nd		7.73	1.9	3.43 14.9
Pamlico Sound NC	PSWB	cvi	nd		7.23	2.8	4.8 4.1
Cape Fear NC	CFBI	cvi	nd		42.66	5.4	1.96 12.7
Charleston Hrb. SC	CHFJ	cvi	nd		30.33	8.2	2.5 3.9
Charleston Hrb. SC	CHSF	cvi	nd		27.66	2	2.6 3.8
Savannah R. Est. GA	SRTI	cvi	nd		24.66	2.3	2.93 3.9
Sapelo Sound GA	SSSI	cvi	nd		25.66	4.4	2.9 5.9
St. Johns River FL	SJCB	cvi	nd		9.03	2.5	1.45 9.6
Matanzas River FL	MRCB	cvi	nd		15.33	3.7	1.4 14.2
Biscayne Bay FL	BBPC	cvi	nd		8.8	16.3	0.38 45.2

Concentrations (ug/g dry weight) of Antimony (Sb) Arsenic (As) and Cadmium (Cd) in bivalves collected during 1986 at Gulf Coast Sites

Location	Code	Species	Sb c.v.%	As	c.v.%	Cd	au 9/
Everglades FL	EVFU	cvi	nd		11.7	3.2	C.V.%
Rookery Bay FL	RBHC	cvi	nd	27.33			19
Naples Bay FL	NBNB	CVI	nd		7.6 16.3	2.4	25.3
Charlotte Harbor FL	CBBI	CVI	nd	38.66	5.9	1.7	5.8
Tampa Bay FL	TBMK	_				3.9	7.6
Tampa Bay FL	TBCB	CVİ	nd nd		18.9	2.53	47
Tampa Bay FL		cvi	nd nd	4.16	6.9	2.46	15.3
Tampa Bay FL	TBHB	CVİ	nd nd	4.83	5.9	2.03	5.6
Cedar Key FL	TBPB	CVİ	nd nd		31.2	2.2	16.3
	CKBP	cvi	nd 0.04		24.3	2.09	17.1
Apalachicola Bay FL	APCP	cvi	0.04		20.8	2.4	20.8
Apalachicola Bay FL	APDB	cvi	nd i	9.33	3	3.43	10.2
St. Andrew Bay FL	SAWB	CVİ	nd	15.66	3.6	1.13	20.3
Choctawhatchee B. FL	CBSP	CVÍ	0.08 87.5		12.1	2.7	7.4
Choctawhatchee B. FL	CBSR	cvi	nd	8.33	3.4	4.73	5.3
Pensacola Bay FL	PBIB	cvi	0.06 86.6	11.33	5	3.86	6.5
Mobile Bay AL	MBCP	cvi	nd	15.66	3.6	2.5	14.4
Mississippi Sound MS	MSPB	cvi	0.13 100		27.2	3	20
Mississippi Sound MS	MSBB	cvi	nd		42.1	2.8	21.7
Mississippi Sound MS	MSPC	cvi	nd		15.8	8.46	9.5
Lake Borgne LA	LBMP	cvi	nd	6.33	4.5	5.43	11
Breton Sound LA	BSSI	cvi	nd		15.2	6.33	16.4
Breton Sound LA	BSBG	cvi	nd		18.4	4.63	16.7
Baritaria Bay LA	BBSD	cvi	nd	9.66	2.9	1.93	43
Barataria Bay LA	BBMB	cvi	nd		10.5	1.06	5.4
Terrebonne Bay LA	TBLF	cvi	nd	14	7.1	2.16	19.2
Terrebonne Bay LA	TBLB	cvi	nd		13.3	1.8	20
Caillou Lake LA	CLCL	cvi	nd ्	7.83	7.3	2.6	13.8
Atchafalaya Bay LA	ABOB	cvi	4	13	7.6	4.3	15.2
Vermillion Bay LA	VBSP	cvi	nd	9.66	11.9	7.5	13.3
Joseph Hrb.Bayou LA	JHJH	cvi	0.03	8	10.8	4.83	15.8
Calcasieu Lake LA	CLSJ	cvi	nd		13.9	4.33	16.2
Sabine Lake TX	SLBB	cvi	nd		15.7	4.16	3.6
Galveston Bay TX	GBHR	cvi	nd	5	0	5.03	8.2
Galveston Bay TX	GBYC	cvi	nd	3.16	3.6	4.6	16.9
Galveston Bay TX	GBTD	cvi	nd	5.33	14.3	4.36	3.4
Galveston Bay TX	GBCR	cvi	nd	6.33	4.5	3.46	16.4
Matagorda Bay TX	MBEM	cvi	nd	8.33	9.1	7.33	7.8
Matagorda Bay TX	MBTP	cvi	nd	14.33	4	0.96	20.9
Matagorda Bay TX	MBGP	cvi	nd	7	7.1	3.96	1.4
Matagorda Bay TX	MBLR	cvi	nd	8	12.5	4.6	13.2
Espiritu Santo TX	ESSP	cvi	nd	14.16	60.3	6.86	53.1
San Antonio Bay TX	SAMP	cvi	nd		17.8	4.93	12.2
San Antonio Bay TX	SAPP	cvi	nd	5.33	5.4	4.53	6.7
Mesquite Bay TX	MBAR	cvi	nd .	5	0	4.66	6.5
Copano Bay TX	CBCR	cvi	nd		17.3	13	13.3
Aransas Bay TX	ABLR	cvi	nd	13.33	8.6	6.33	9.1
Corpus Christi TX	CCIC	cvi	nd	12	8.3	4.5	10.1
Corpus Christi TX	CCNB	cvi	nd		10	8.83	11.7
Lower Laguna MadTX	LMSB	cvi	nd		18.6	3.83	5.4

Concentrations (ug/g dry weight) of Antimony (Sb) Arsenic (As) and Cadmium (Cd) in bivalves collected during 1986 at West Coast Sites

Location	Code	Species	Sb	c.v.%	As	c.v.%	Cd	c.v.%
Imperial Beach CA	IBIB	mca	0.62	26.5	11.3	13.9	0.86	4.6
San Diego Bay CA	SDHI	med	nd		16	0	6.53	1.7
Point Loma CA	PLLH	mca	1.02	38.6	21.66	5.3	1.63	19.6
Mission Bay CA	MBVB	med	0.85	45.9	13	.20.3	3.26	6.3
La Jolla CA	LJLJ	mca	0.31	86.6	14.66	3.9	2.26	30.9
Oceanside CA	OSBJ	med	nd		7.1	14.2	2.7	3.7
Newport Beach CA	NBBC	mca	1.66	12.4	8.3	2	1.02	25.9
Anaheim Bay CA	ABWJ	mca	1.4	12.3	7.43	13.4	0.75	11.8
San PedroHbr CA	SPFP	med	0.42	90.1	7.6	6	2.03	7.5
Palos Verdes CA	PVRP	mca	0.6		4.66		0.5	
Santa Cruz Island CA	SCFP	mca	0.15		19.66	14.6	5.36	40.8
Marina Del Ray CA	MDSJ	med	0.7	88.8	10	9.5	3.13	1.8
Pt. Dume CA	PDPD	mca	1.53	30.8	10.86	11	1.73	8.8
Santa Catalina I. CA	SCBR	mca	0.62	48.9	6	32.4	3.4	25.6
Pt. Santa Barbara CA	SBSB	mca	0.57	15.7	17	5.8	3	13.3
Pt. Conception CA	PCPC	mca	0.41	91.8	21.33	5.4	3.86	17.6
San Luis Obispo B. CA		mca	0.16		12	0	2	22.9
San Simeon Point CA	SSSS	mca	0.41	88.4	18	20_	5	25.5
Pacific Grove CA	PGLP	mca	0.95	36.1	15.66	14.7	2.63	38.2
Monterey Bay CA	MBSC	mca	0.55		14		1.93	
San Francisco Bay CA	SFDB	med	nd		1.96	2.9	6.96	9.7
San Francisco Bay CA	SFSM	med	nd		2.46	40.6	5.73	5.3
Tomales Bay CA	TBSR	med	0.71	30.7	6.8	24.2	5.53	23.8
Bodega Bay CA	BBBE	mca	0.69	31.7	15.33	9.9	3.83	35.2
Point Arena CA	PAPA	mca	0.18		19	15.7	5.13	32.4
Pt. Delgada CA	PDSC	mca	0.76	34.2	16.33	23.1	7.56	32.4
Humboldt Bay CA	HMBJ	mca	0.39	91.3	8.46	19.1	4.46	15.8
Point St. George CA	SGSG	mca	nd		12.33	4.6	5.1	10.3
Coos Bay OR	CBCH	mca	nd		10.26	6.2	2.9	18.2
Coos Bay OR	CBRP	med	nd		9.46	3.2	3.7	7.1
Yaquina Bay OR	YBOP	med	nd		7.53	9.4	3.7	9.7
Yaquina Head OR	YHYH	mca	nd		12	0	3.73	8.1
Tillamook Bay OR	TBHP	med	nd		9	11.2	3.33	6.9
Columbia River OR	CRSJ	med	nd		9.73	3.1	3.9	2.5
Gray's Harbor WA	GHWJ	mca	nd		8.83	4.2	2.63	7.9
Str. Juan de Fuca WA	JFCF	mca	nd		12.33	9.3	6.83	36.3
South Puget Sound W.		med	nd		6.96	2.9	2.36	17
Commencement B. WA		med	nd		9.3	17.3	4.56	21.9
Elliott Bay WA	EBFR	med	nd		8.16	13.2	2.86	24.5
Sinclair Inlet WA	SIWP	med	nd		9.16	8	2.93	11.9
Whidbey Island WA	WIPP	med	nd		7.43	3.8	2.46	6.1
Bellingham Bay WA	BBSM	med	nd		9.66	3.6	3.4	10.6
Point Roberts WA	PRPR	med	nd		9.2	5.7	3.2	9.3
Unakwit Inlet AK	UISB	med	nd		16	6.2	4.63	4.4
Port Valdez AK	PVMC	med	nd		12.66	4.5	2.83	13.3
Barber's Point HI	BPBP	osa	0.24		16	22.5	0.95	77.5
Honolulu Harbor HI	HHKL	osa	nd		22	24	1.56	13.2

Concentrations (ug/g dry weight) of Chromium (Cr) Copper (Cu) and Lead (Pb) in bivalves collected in 1986 at East Coast Sites

Location	Code	Species	Cr	c.v.%	Cu	c.v.%	Pb	c.v.%
Penobscot Bay ME	PBŞI	med	1.49	38.2	9.3	1.8	1.53	9.9
Penobscot Bay ME	PBPI	med	1.43	4	6.63	6	1.9	10.5
Boston Harbor MA	BHDI	med	2.36	8.7	12.66	4.5	8.26	9.3
Boston Harbor MA	BHDB	med	2.53	22.4	13.33	8.6	13	13.3
Boston Harbor MA	BHHB	med	2.66	95.3	10.86	11	8.4	6.2
Boston Harbor MA	BHBI	med	1.6	6.2	10.26	6.2	4.43	10.4
Buzzards Bay MA	BBRH	med	1.43	24.5	10	10	3.43	9.3
Buzzards Bay MA	BBAR	med	1.36	8.4	10.06	8	4.6	15.2
Buzzards Bay MA	BBGN	med	0.29		5.6		0.93	
Narragansett Bay RI	NBCI	med	0.9	10.5	11	0	2.86	4
Narragansett Bay RI	NBDI	med	1.86	16.3	14.33	4	6.13	4.9
Long Island Snd CT	LICR	med	2.96	15.9	14.66	10.4	3.26	27.6
Long Island Snd CT	LINH	med	1.13	10.1	11	0	2.66	15.6
Long Island Snd CT	LIHR	med	5.56	6.3	20.33	7.5	3.94	68.6
Long Island Snd CT	LIŞI	med	0.85	7.5	10.66	5.4	2.53	4.5
Long Island Snd NY	LIMR	med	1.09	10	14	0	5.06	3
Long Island Snd NY	LIHH	med	1.04	12.8	13.33	8.6	3.56	7
Long Island Snd NY	LITN	med	2	10	16.66	9.1	7.19	6
Long Island Snd NY	LIHU	med	0.73	3.4	12	0	2.76	7.5
Long Island Snd NY	LIPJ	med	0.81	6.7	11.66	4.9	2.2	9
Moriches Bay NY	MBTH	med	1.3	13.3	9.7	6	2.6	6.7
Hud/Rar Estuary NY	HRJB	med	1.02	15.7	10	0	3.13	19.2
Hud/Rar Estuary NY	HRUB	med	10.96	9.5	16.66	9.1	14	14.2
Hud/Rar Estuary NY	HRLB	med	1.76	3.2	10.13	7.9	3.7	8.1
New York Bight NJ	NYSH	med	1.53	7.5	12.66	12	6.03	12.6
New York Bight NJ	NYLB	med	2.03	19.8	10.66	5.4	3.1	5.5
New York Bight NJ	NYSR	med	1.23	4.6	10.3	5.9	2.53	2.2
Delaware Bay DE	DBFE	cvi	0.38	33.1	233.33	24.7	0.46	25.9
Delaware Bay DE	DBBD	cvi	0.36	11.4	340	7.7	0.66	12.7
Delaware Bay DE	DBAP	cvi	2.09	28.9	673.33	12.6	1.53	26.3
Delaware Bay DE	DBKI	cvi	0.95	54.9	400	25	1	44.1
Chesapeake Bay MD	CBMP	cvi	0.88	10.9	336.66	9	0.33	19.3
Chesapeake Bay MD	CBHP	cvi	0.26	12 2	13.33	7.1	0.31	11.6
Chesapeake Bay MD	CBHG	cvi	0.18	16.6	98	10.7	0.31	34.1
Chesapeake Bay VA	CBIB	cvi	0.11	4.9	71	10.1	0.17	41.7
Chesapeake Bay VA	CBCC	cvi	0.14	21.9	31.66	1.8	0.23	79.8
Chesapeake Bay VA	CBST	cvi	0.19	5.2	66.66	14.4	0.3	39.6
Chincoteague Bay VA	CBCI	cvi	0.43	19.8	99.33	1.1	0.34	44.1
Quinby Inlet VA	QIUB	cvi	0.42	14.4	200	0	0.31	16.2
Roanoke Sound NC	RSJC	cvi	0.53	23.8	95.66	7.8	0.42	27.6
Pamlico Sound NC	PSWB	CVÍ	0.86	55.4	62.66	4.8	0.51	43.5
Cape Fear NC	CFBI	cvi	0.45	13.4	62.66	6.6	0.27	3.7
Charleston Hrb. SC	CHFJ	cvi	0.86	12.3	120	8.3	0.39	7.7
Charleston Hrb. SC	CHSF	cvi	0.57	32.8	143.33	4	0.31	9.6
Savannah R. Est. GA Sapelo Sound GA	SRTI SSSI	cvi	0.34	25.1	62	10.5	0.11	15.7
St. Johns River FL		CVİ	0.36	31.5	69.33	3	0.16	31.4
Matanzas River FL	SJCB MRCB	cvi	0.46	18.1	52.33	14.8	0.93	11.3
Biscayne Bay FL		cvi	0.25	12	50	15.6	0.23	6.5
DISCAYITE DAY FL	BBPC	cvi	0.21	9.7	110.66	14.6	0.17	148.9

Concentrations (ug/g dry weight) of Chromium (Cr) Copper (Cu) and Lead (Pb) in bivalves collected in 1986 at Gulf Coast Sites

Location	Code	Species	Cr	c.v.%	Cu	c.v.%	Pb	c.v.%
Everglades FL	EVFU	Cvi	1.5	37.1	44.66	30.4	0.1	60.2
Rookery Bay FL	RBHC	cvi	1.16	57	68.33	29.5	0.17	81.7
Naples Bay FL	NBNB	cvi	0.54	25.2	326.66	22.9	0.19	22.9
Charlotte Harbor FL	CBBI	cvi	0.68	30.4	85	5.8	0.09	70.4
Tampa Bay FL	TBMK	cvi	0.96	48.8	43	30.4	0.51	46.1
Tampa Bay FL	TBCB	cvi	0.53	10.8	91.66	8.3	0.14	39.3
Tampa Bay FL	TBHB	cvi	0.7	7.1	81.66	21.5	1.36	40.2
Tampa Bay FL	TBPB	cvi	0.86	26	66.66	18.8	0.95	15.7
Cedar Key FL	CKBP	cvi	0.51	82.4	14.66	14.1	0.19	18.1
Apalachicola Bay FL	APCP	cvi	0.35	15.1	43	25.1	0.24	31.3
Apalachicola Bay FL	APDB	cvi	0.98	30.6	68.33	4.2	0.14	44.6
St. Andrew Bay FL	SAWB	cvi	0.56	29.2	416.66	6.9	1.23	12.3
Choctawhatchee B. FL	CBSP	cvi	0.44	12.3	71.66	4	2.33	23.6
Choctawhatchee B. FL	CBSR	cvi	0.27	43.4	83.33	9.1	0.12	30.6
Pensacola Bay FL	PBIB	cvi	0.7	31.1	75	6.6	0.41	19.9
Mobile Bay AL	MBCP	cvi	0.73	14.1	100	10	0.39	14
Mississippi Sound MS	MSPB	cvi	1.07	68.7	103.33	31.1	0.61	12.3
Mississippi Sound MS	MSBB	cvi		101.6	143.33	26.4	0.73	14.1
Mississippi Sound MS	MSPC	cvi	0.61	55.6	143.33	4	0.33	44.2
Lake Borgne LA	LBMP	cvi	0.36	19.7	293.33	25.5	0.44	12.3
Breton Sound LA	BSSI	cvi	0.21	49.3	116.66	17.8	0.32	12.8
Breton Sound LA	BSBG	cvi	0.27	18.5	73.33	3.9	0.26	5.8
Baritaria Bay LA	BBSD	cvi	0.24	7.2	59.33	38.6	0.37	4.6
Barataria Bay LA	BBMB	cvi	0.13	29.5	26	24	0.39	14
Terrebonne Bay LA	TBLF	cvi	0.29	32	70	14.2	0.45	11.1
Terrebonne Bay LA	TBLB	cvi	0.49	38.8	58.33	17.8	0.72	58.1
Caillou Lake LA	CLCL	cvi	0.48	11.9	95	5.2	0.22	45.9
Atchafalaya Bay LA	ABOB	cvi	0.49	28.3	116.66	17.8	0.71	59.3
Vermillion Bay LA	VB\$P	cvi	8.0	12.5	353.33	5.8	0.54	35.2
Joseph Hrb.Bayou LA	JHJH	cvi	0.73	25.8	173.33	6.6	1.38	88.8
Calcasieu Lake LA	CLSJ	cvi	0.26	22.6	183.33	22.7	0.41	8.7
Sabine Lake TX	SLBB	cvi	0.98	33	90	20	0.58	30.1
Galveston Bay TX	GBHR	cvi	0.22	70.8	110	9	0.34	13.6
Galveston Bay TX	GBYC	cvi	0.34	38.4	140	43.4	0.48	17
Galveston Bay TX	GBTD	cvi	0.27	16.1	115	37.6	0.55	9
Galveston Bay TX	GBCR	cvi	0.19	37.9	123.33	4.6	0.42	9.4
Matagorda Bay TX	MBEM	cvi	0.95	41.1	190	10.5	0.53	19.5
Matagorda Bay TX	MBTP	cvi	1.3	13.3	9.66	5.9	2.6	6.6
Matagorda Bay TX	MBGP	cvi	0.63	16.4	88.33	3.2	0.44	23.6
Matagorda Bay TX	MBLR	cvi	0.6	22	123.33	4.6	0.51	31.1
Espiritu Santo TX	ESSP	cvi	0.68	69.3	170	45.9	0.58	62
San Antonio Bay TX	SAMP	cvi	0.31	30.6	266.66	7.8	0.85	44.4
San Antonio Bay TX	SAPP	cvi	4.9	125.9	146.66	21.9	0.6	62.9
Mesquite Bay TX	MBAR	cvi	0.4	29.7	96.66	13	0.39	56.8
Copano Bay TX	CBCR	cvi	0.51	11.1	280	0	0.65	7.6
Aransas Bay TX	ABLR	cvi	0.66	4.3	170	15.5	0.55	9
Corpus Christi TX	CCIC	cvi	0.26	61.8	73.33	17.1	0.46	28.1
Corpus Christi TX	CCNB	cvi	0.33	47.6	166.66	24.2	0.48	11.9
Lower Laguna MadTX	LMSB	cvi	0.41	61.7	120	14.4	0.25	26.2

Concentrations (ug/g dry weight) of Chromium (Cr) Copper (Cu) and Lead (Pb) in bivalves collected in 1986 at West Coast Sites

Location	Code	Species	Cr	c.v.%	Cu	c.v.%	Pb	c.v.%
Imperial Beach CA	IBIB	mca	0.99	1.7	8.7	9.8	1.5	11.5
San Diego Bay CA	SDHI	med	2.36	4.8	17	17.6	4.43	2.6
Point Loma CA	PLLH	mca	1.16	4.9	11.33	13.4	2.43	6.2
Mission Bay CA	MBVB	med	1.04	9.9	6.5	7.9	1.8	5.5
La Jolla CA	LJLJ	mca	1.36	11.1	6.93	32.7	5.9	17.8
Oceanside CA	OSBJ	med	1.8	11.1	8.06	11.5	1.26	92
Newport Beach CA	NBBC	mca	1.36	4.2	6.26	6	5.33	15
Anaheim Bay CA	ABWJ	mca	1.83	15.7	8.7	5.2	14.66	15.7
San PedroHbr CA	SPFP	med	2.43	18.5	12.7	4.6	3.17	4.8
Palos Verdes CA	PVRP	mca	0.86		2.93		0.83	
Santa Cruz Island CA	SCFP	mca	1.93	15.8	6.5	18.6	1.09	28.9
Marina Del Ray CA	MDSJ	med	3.73	19.3	10.86	11	23.33	21.5
Pt. Dume CA	PDPD	mca	2.53	12	11	9	2.96	11.8
Santa Catalina I. CA	SCBR	mca	1.23	20.4	7.03	24.9	2.03	15
Pt. Santa Barbara CA	SBSB	mca	2.23	5.1	7.93	5.9	1.23	16.8
Pt. Conception CA	PCPC	mca	1.93	38.1	9	9	1.26	9.1
San Luis Obispo B. CA	SLSL	mca	1.4	18.8	9.13	8.2	0.93	6.5
San Simeon Point CA	SSSS	mca	2.7	29.3	7.6	21.8	0.82	15.1
Pacific Grove CA	PGLP	mca	1.05	12.2	7.19	6	5.9	17.9
Monterey Bay CA	MBSC	mca	1.5		5.43		3.4	
San Francisco Bay CA	SFDB	med	2.09	9.5	8.63	7.7	0.75	6.5
San Francisco Bay CA	SFSM	med	2	13.2	7.96	9.2	0.5	16.4
Tomales Bay CA	TBSR	med	3.16	20	8	8.7	0.42	17.7
Point Arena CA	PAPA	mca	2.43	11.8	8.16	3	1.16	18.6
Pt. Delgada CA	PDSC	mca	2.43	31.3	7.56	9.2	1.93	20.9
Humboldt Bay CA	HMBJ	mca	3.9	11.7	9.16	5.5	0.82	9.7
Point St. George CA	SGSG	mca	3.4	30.9	9.3	6.5	0.75	2.7
Coos Bay OR	CBCH	mca	2.13	18.9	9.73	12.8	0.69	14.9
Coos Bay OR	CBRP	med	2.16	16.2	10.96	16_	0.86	7.1
Bodega Bay CA	BBBE	mca	2.26	2.5	9.59	3.7	1.09	9.5
Yaquina Bay OR	YBOP	med	2.46	12.3	9.8	3.5	0.75	7.2
Yaquina Head OR	YHYH	mca	2.16	5.3	10.6	6.5	0.6	5_
Tillamook Bay OR	TBHP	med	1.83	22	8.03	18.2	0.48	7.5
Columbia River OR	CRSJ	med	1.4	14.2	10.43	13_	0.6	0.9
Gray's Harbor WA	GHWJ	mca	1.73	28.4	10.33	5.5	0.44	3.4
Str. Juan de Fuca WA	JFCF	mca	1.93	14.9	8.66	2.9	0.73	6.1
South Puget Sound WA		med	0.68	9.6	8.16	1.8	0.88	11.1
Commencement B. WA		med	1.6	31.2	9	8.6	3.03	28
Elliott Bay WA Sinclair Inlet WA	EBFR	med	1.5	11.5	11.56	14.6	4.43	20.9
	SIWP	med	1.12	19.4	8.26	6.8	1.7	10.1
Whidbey Island WA	WIPP	med	2.66	13.1	8.26	9.7	0.44	13.4
Bellingham Bay WA	BBSM	med	4.13	12.4	11.33	5	1.02	6.6
Point Roberts WA	PRPR	med	2.43	19.4	9.8	2.6	0.74	9.4
Unakwit Inlet AK	UISB	med	1.96	14.6	9.7	2.7	1	0
Port Valdez AK	PVMC	med	2.53	23.7	10.66	5.4	1.46	7.8
Barber's Point HI	BPBP	osa.	2.2	12	1602.96	88.1	5.2	31.7
Honolulu Harbor HI	HHKL	osa.	1.34	36.7	253	54	0.58	37.3

Concentrations (ug/g dry weight) of Mercury (Hg) Nickel (Ni) and Selenium (Se) in bivalves collected during 1986 at East Coast Sites

Penobscot Bay ME	Location	Code S	Species	Hg	c.v.%	Ni	c.v.%	Se	c.v.%
Penobscot Bay ME									
Boston Harbor MA									
Boston Harbor MA									
Boston Harbor MA									
Boston Harbor MA BBRH med 0.19 2.9 1.01 7.5 2.06 13.9									
Buzzards Bay MA BBRH med 0.11 9 1.9 5.2 2.3 24.2									
Buzzards Bay MA BBAR med 0.08 9.3 1.26 18.2 2.46 8.4									
Buzzards Bay MA Narragansett Bay RI NBCI med 0.09 3.36 4.5 2.36 15.9									
Narragansett Bay RI NBCI med 0.09							. •		• • • • • • • • • • • • • • • • • • • •
Narragansett Bay RI Long Island Snd CT LICR med 0.08 33.3 4.23 11.1 3.6 10 Long Island Snd CT LINH med 0.05 26.9 1.56 3.6 2.63 19.1 Long Island Snd CT LINH med 0.07 31.4 1.2 8.3 2.26 9.1 Long Island Snd CT LISI med 0.07 31.4 1.2 8.3 2.26 9.1 Long Island Snd NY LIMR med 0.06 24.1 1.96 5.8 2.4 4.1 Long Island Snd NY LIMR med 0.05 10.1 1.8 11.1 2.03 20.4 Long Island Snd NY LIHH med 0.05 10.1 1.8 11.1 2.03 20.4 Long Island Snd NY LIHU med 0.06 9.1 1.55 3.6 2.26 5 Long Island Snd NY LIHU med 0.06 9.1 1.56 3.6 2.26 5 Long Island Snd NY LIHU med 0.06 9.1 1.57 3.7 2.09 12.6 Hud/Rar Estuary NY HRJB med 0.21 14.2 1.2 8.3 2.26 5 Hud/Rar Estuary NY HRJB med 0.21 14.2 1.2 8.3 2.26 5 Hud/Rar Estuary NY HRJB med 0.21 14.2 1.2 8.3 2.26 5 Hud/Rar Estuary NY HRJB med 0.21 14.2 1.2 8.3 2.26 5 Hud/Rar Estuary NY HRJB med 0.22 17 1.57 3.7 2.09 12.6 5 Hud/Rar Estuary NY HRJB med 0.24 4.1 1.2 8.3 2.26 5 New York Bight NJ NYSH med 0.24 4.1 2.2 12 3.8 21.5 New York Bight NJ NYSH med 0.24 4.1 2.2 12 3.8 21.5 New York Bight NJ NYSH med 0.24 4.1 2.2 12 3.8 21.5 New York Bight NJ NYSH med 0.24 4.1 2.2 12 3.8 21.5 Delaware Bay DE DBFE cvi 0.07 7.8 4.19 16.6 2.53 12.6 Delaware Bay DE DBBD cvi 0.07 7.8 4.19 16.6 2.53 12.6 Delaware Bay DE DBBD cvi 0.07 7.8 4.19 16.6 2.53 12.6 Delaware Bay DE DBBD cvi 0.07 7.8 4.19 16.6 2.53 12.6 Delaware Bay DE DBBD cvi 0.07 7.8 4.19 16.6 2.53 12.6 Chesapeake Bay MD CBMP cvi 0.02 24.7 6.56 8.3 3.6 10 Chesapeake Bay MD CBMP cvi 0.02 24.7 6.56 8.3 3.6 10 Chesapeake Bay WA CBBP cvi 0.00 33.3 3.3 1.8 5.5 3.8 6.9 Chesapeake Bay VA CBBC cvi 0.01 77.6 5.76 7.2 3.06 10.4 Chesapeake Bay VA CBBC cvi 0.02 24.7 6.56 8.3 3.6 10 Chesapeake Bay VA CBBC cvi 0.04 24.7 2.16 10.6 2.4 4.1 Chincoteague B VA CBCC cvi 0.08 12.5 2.76 11.6 1.76 8.6 Chesapeake Bay VA CBBC cvi 0.09 11.2 4.5 2.23 14.3 1.86 22.3 Chincoteague B VA CBCC cvi 0.04 24.7 2.16 10.6 2.4 4.1 Chincoteague B VA CBCC cvi 0.05 11.1 2.13 28.6 1.76 8.6 Chesapeake Bay VA CBCC cvi 0.06 1.76 1.2 2.2 2.05 5.9 Charleston Hrb. SC CHFJ cvi 0.07 41.9 1.26 9.1 2.26 14.1 Matanzas							4.5		15.9
Long Sland Snd CT					15.6				
Long Island Snd CT									
Long Island Snd CT LISI med 0.08 13.3 3.1 5.5 2.8 9.4 Long Island Snd CT LISI med 0.07 31.4 1.2 8.3 2.26 9.1 Long Island Snd NY LIMR med 0.06 24.1 1.96 5.8 2.4 4.1 Long Island Snd NY LIHH med 0.05 10.1 1.8 11.1 2.03 20.4 Long Island Snd NY LITN med 0.06 9.1 1.56 3.6 2.26 5 Long Island Snd NY LIPJ med 0.08 12.5 1.43 20.1 2.8 15.5 Moriches Bay NY MBTH med 0.21 14.2 1.2 8.3 2.26 5 Hud/Rar Estuary NY HRJB med 0.21 14.2 1.2 8.3 2.26 5 Hud/Rar Estuary NY HRUB med 0.21 14.2 1.2 8.3 2.26 5 Hud/Rar Estuary NY HRUB med 0.24 1.8 0.28 1.8 1.1 2.76 5.5 New York Bight NJ NYSH med 0.24 4.1 2.2 12 3.8 21.5 New York Bight NJ NYSH med 0.24 4.1 2.2 12 3.8 2.15 New York Bight NJ NYSH med 0.24 4.1 2.2 12 3.8 2.15 New York Bight NJ NYSR med 0.24 7.2 2.06 12.1 3 8.8 Delaware Bay DE DBBD cvi 0.07 7.8 4.19 16.6 2.53 12.6 Delaware Bay DE DBBD cvi 0.07 7.8 4.19 16.6 2.53 12.6 Delaware Bay DE DBKI Cvi 0.07 7.8 4.19 16.6 2.53 12.6 Delaware Bay DE DBKI Cvi 0.07 7.8 4.19 16.6 2.53 12.6 Delaware Bay DE DBKI Cvi 0.07 7.8 4.19 16.6 2.8 Delaware Bay DE DBKI Cvi 0.07 7.8 4.19 16.6 2.8 Delaware Bay DE DBKI Cvi 0.07 7.8 4.19 16.6 2.53 3.6 10 Chesapeake Bay MD CBHP cvi 0.02 24.7 6.56 8.3 3.6 10 Chesapeake Bay WA CBIB Cwi 0.04 3.96 17.7 3.06 13.5 Chesapeake Bay VA CBIB Cwi 0.04 2.2 2.06 11.6 2.2 2.03 23.2 Chincoteague B VA CBCC cvi 0.08 Chesapeake Bay VA CBCC Cvi 0.08 1.6 2.2 2.09 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5			_						
Long Island Snd CT									
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Long Island Snd NY			med						
LipJ med		LIHU							
Hud/Rar Estuary NY HRJB med 0.21 14.2 1.2 8.3 2.26 5 Hud/Rar Estuary NY HRUB med 0.47 9.2 4.63 18.1 3.33 14.1 Hud/Rar Estuary NY HRLB med 0.28 4 1.86 11.1 2.76 5.5 New York Bight NJ NYSH med 0.24 4.1 2.2 12 3.8 21.5 New York Bight NJ NYSR med 0.24 7.2 2.06 12.1 3 8.8 Delaware Bay DE DBFE cvi 0.07 7.8 4.19 16.6 2.53 12.6 Delaware Bay DE DBAP cvi 0.08 6.6 4.66 9.6 2.8 Delaware Bay MD CBMP cvi 0.02 24.7 6.56 8.3 3.6 10 Chesapeake Bay MD CBHP cvi 0.01 77.6 5.76 7.2 3.06 10.4 Chesapeake Bay V	Long Island Snd NY	LIPJ		0.08			20.1	2.8	15.5
Hud/Rar Estuary NY HRJB med 0.21 14.2 1.2 8.3 2.26 5 Hud/Rar Estuary NY HRUB med 0.47 9.2 4.63 18.1 3.33 14.1 Hud/Rar Estuary NY HRLB med 0.28 4 1.86 11.1 2.76 5.5 New York Bight NJ NYSH med 0.24 4.1 2.2 12 3.8 21.5 New York Bight NJ NYSR med 0.24 7.2 2.06 12.1 3 8.8 Delaware Bay DE DBFE cvi 0.07 7.8 4.19 16.6 2.53 12.6 Delaware Bay DE DBAP cvi 0.08 6.6 4.66 9.6 2.8 Delaware Bay MD CBMP cvi 0.02 24.7 6.56 8.3 3.6 10 Chesapeake Bay MD CBHP cvi 0.01 77.6 5.76 7.2 3.06 10.4 Chesapeake Bay V	Moriches Bay NY	MBTH	med	0.32	17	1.57	3.7	2.09	12.6
Hud/Rar Estuary NY HRLB med 0.28 4 1.86 11.1 2.76 5.5 New York Bight NJ NYSH med 0.24 4.1 2.2 12 3.8 21.5 New York Bight NJ NYSR med 0.16 16.5 1.96 10.5 3.26 3.5 New York Bight NJ NYSR med 0.24 7.2 2.06 12.1 3 8.8 Delaware Bay DE DBFE cvi 0.07 7.8 4.19 16.6 2.53 12.6 Delaware Bay DE DBBD cvi 0.07 15 4.43 5.2 2.63 13.3 Delaware Bay DE DBKI cvi 0.07 27.1 4.23 36.3 3 23.3 Chesapeake Bay MD CBMP cvi 0.02 24.7 6.56 8.3 3.6 10 Chesapeake Bay MD CBHP cvi 0.01 7.76 5.76 7.2 3.06 10.4	Hud/Rar Estuary NY	HRJB	med	0.21	14.2	1.2		2.26	5
New York Bight NJ NYSH med 0.24 4.1 2.2 12 3.8 21.5 New York Bight NJ NYLB med 0.16 16.5 1.96 10.5 3.26 3.5 New York Bight NJ NYSR med 0.24 7.2 2.06 12.1 3 8.8 Delaware Bay DE DBFE cvi 0.07 7.8 4.19 16.6 2.53 12.6 Delaware Bay DE DBBD cvi 0.07 15 4.43 5.2 2.63 13.3 Delaware Bay DE DBKI cvi 0.08 6.6 4.66 9.6 2.8 Delaware Bay DE DBKI cvi 0.07 27.1 4.23 36.3 3 23.3 Chesapeake Bay MD CBMP cvi 0.01 77.6 5.76 7.2 3.06 10.4 Chesapeake Bay VA CBIB cvi 0.03 33.3 3.1 8.5 3.8 6.9 Chincoteague B VA<	Hud/Rar Estuary NY	HRUB	med	0.47	9.2	4.63	18.1	3.33	14.1
New York Bight NJ NYSH med 0.24 4.1 2.2 12 3.8 21.5 New York Bight NJ NYLB med 0.16 16.5 1.96 10.5 3.26 3.5 New York Bight NJ NYSR med 0.24 7.2 2.06 12.1 3 8.8 Delaware Bay DE DBFE cvi 0.07 7.8 4.19 16.6 2.53 12.6 Delaware Bay DE DBAP cvi 0.07 15 4.43 5.2 2.63 13.3 Delaware Bay DE DBKI cvi 0.08 6.6 4.66 9.6 2.8 Delaware Bay DE DBKI cvi 0.07 27.1 4.23 36.3 3 23.3 Chesapeake Bay MD CBMP cvi 0.01 77.6 5.76 7.2 3.06 10.4 Chesapeake Bay VA CBIB cvi 0.03 33.3 3.1 8.5 3.8 6.9 Chincoteague B VA<	Hud/Rar Estuary NY	HRLB	med	0.28	4	1.86	11.1	2.76	5.5
New York Bight NJ NYLB med 0.16 16.5 1.96 10.5 3.26 3.5 New York Bight NJ NYSR med 0.24 7.2 2.06 12.1 3 8.8 Delaware Bay DE DBFE cvi 0.07 7.8 4.19 16.6 2.53 12.6 Delaware Bay DE DBAD cvi 0.07 15 4.43 5.2 2.63 13.3 Delaware Bay DE DBKI cvi 0.07 27.1 4.23 36.3 3 23.3 Chesapeake Bay MD CBMP cvi 0.02 24.7 6.56 8.3 3.6 10 Chesapeake Bay MD CBHP cvi 0.01 77.6 5.76 7.2 3.06 10.4 Chesapeake Bay VA CBIB cvi 0.03 33.3 3.1 8.5 3.8 6.9 Chesapeake Bay VA CBC cvi 0.08 12.5 2.76 11.6 1.76 8.6	New York Bight NJ	NYSH	med	0.24	4.1	2.2	12	3.8	21.5
Delaware Bay DE DBFE cvi 0.07 7.8 4.19 16.6 2.53 12.6 Delaware Bay DE DBBD cvi 0.07 15 4.43 5.2 2.63 13.3 Delaware Bay DE DBKI cvi 0.08 6.6 4.66 9.6 2.8 Delaware Bay DE DBKI cvi 0.07 27.1 4.23 36.3 3 23.3 Chesapeake Bay MD CBMP cvi 0.02 24.7 6.56 8.3 3.6 10 Chesapeake Bay MD CBHP cvi 0.01 77.6 5.76 7.2 3.06 10.4 Chesapeake Bay VA CBIB cvi 0.04 3.96 17.7 3.06 13.5 Chesapeake Bay VA CBIB cvi 0.03 33.3 3.1 8.5 3.8 6.9 Chesapeake Bay VA CBST cvi 0.08 12.5 2.76 11.6 1.76 8.6 Chesapeake Bay VA <td< td=""><td>New York Bight NJ</td><td>NYLB</td><td>med</td><td>0.16</td><td></td><td>1.96</td><td>10.5</td><td>3.26</td><td>3.5</td></td<>	New York Bight NJ	NYLB	med	0.16		1.96	10.5	3.26	3.5
Delaware Bay DE DBBD cvi 0.07 15 4.43 5.2 2.63 13.3 Delaware Bay DE DBAP cvi 0.08 6.6 4.66 9.6 2.8 Delaware Bay DE DBKI cvi 0.07 27.1 4.23 36.3 3 23.3 Chesapeake Bay MD CBMP cvi 0.02 24.7 6.56 8.3 3.6 10 Chesapeake Bay MD CBHP cvi 0.01 77.6 5.76 7.2 3.06 10.4 Chesapeake Bay WA CBIB cvi 0.03 33.3 3.1 8.5 3.8 6.9 Chesapeake Bay VA CBCC cvi 0.08 12.5 2.76 11.6 1.76 8.6 Chesapeake Bay VA CBST cvi 0.08 12.5 2.76 11.6 1.76 8.6 Chesapeake Bay VA CBST cvi 0.09 1.6 22.5 2.03 23.2 Chincoteague B VA <t< td=""><td>New York Bight NJ</td><td>NYSR</td><td>med</td><td>0.24</td><td></td><td>2.06</td><td>12.1</td><td>3</td><td>8.8</td></t<>	New York Bight NJ	NYSR	med	0.24		2.06	12.1	3	8.8
Delaware Bay DE DBAP cvi 0.08 6.6 4.66 9.6 2.8 Delaware Bay DE DBKI cvi 0.07 27.1 4.23 36.3 3 23.3 Chesapeake Bay MD CBMP cvi 0.02 24.7 6.56 8.3 3.6 10 Chesapeake Bay MD CBHP cvi 0.01 77.6 5.76 7.2 3.06 10.4 Chesapeake Bay WA CBIB cvi 0.04 3.96 17.7 3.06 13.5 Chesapeake Bay VA CBIB cvi 0.03 33.3 3.1 8.5 3.8 6.9 Chesapeake Bay VA CBCC cvi 0.08 12.5 2.76 11.6 1.76 8.6 Chesapeake Bay VA CBST cvi 0.09 1.6 22.5 2.03 23.2 Chincoteague B VA CBCI cvi 0.12 4.5 2.23 14.3 1.86 22.3 Quinby Inlet VA QIUB	Delaware Bay DE	DBFE	cvi	0.07	7.8	4.19	16.6	2.53	12.6
Delaware Bay DE DBKI cvi 0.07 27.1 4.23 36.3 3 23.3 Chesapeake Bay MD CBMP cvi 0.02 24.7 6.56 8.3 3.6 10 Chesapeake Bay MD CBHP cvi 0.01 77.6 5.76 7.2 3.06 10.4 Chesapeake Bay WA CBIB cvi 0.04 3.96 17.7 3.06 13.5 Chesapeake Bay VA CBIB cvi 0.03 33.3 3.1 8.5 3.8 6.9 Chesapeake Bay VA CBCC cvi 0.08 12.5 2.76 11.6 1.76 8.6 Chesapeake Bay VA CBST cvi 0.09 1.6 22.5 2.03 23.2 Chincoteague B VA CBST cvi 0.12 4.5 2.23 14.3 1.86 22.3 Quinby Inlet VA QIUB cvi 0.13 11.1 2.13 28.6 1.76 8.6 Roanoke Sound NC	Delaware Bay DE	DBBD	cvi	0.07		4.43	5.2		13.3
Chesapeake Bay MD CBMP cvi 0.02 24.7 6.56 8.3 3.6 10 Chesapeake Bay MD CBHP cvi 0.01 77.6 5.76 7.2 3.06 10.4 Chesapeake Bay MD CBHG cvi 0.04 3.96 17.7 3.06 13.5 Chesapeake Bay VA CBIB cvi 0.03 33.3 3.1 8.5 3.8 6.9 Chesapeake Bay VA CBCC cvi 0.08 12.5 2.76 11.6 1.76 8.6 Chesapeake Bay VA CBST cvi 0.09 1.6 22.5 2.03 23.2 Chincoteague B VA CBST cvi 0.12 4.5 2.23 14.3 1.86 22.3 Quinby Inlet VA QIUB cvi 0.13 11.1 2.13 28.6 1.76 8.6 Roanoke Sound NC RSJC cvi 0.04 24.7 2.16 10.6 2.4 4.1 Pamlico Sound NC	Delaware Bay DE	DBAP	cvi	0.08		4.66	9.6	2.8	
Chesapeake Bay MD CBHP cvi 0.01 77.6 5.76 7.2 3.06 10.4 Chesapeake Bay MD CBHG cvi 0.04 3.96 17.7 3.06 13.5 Chesapeake Bay VA CBIB cvi 0.03 33.3 3.1 8.5 3.8 6.9 Chesapeake Bay VA CBCC cvi 0.08 12.5 2.76 11.6 1.76 8.6 Chesapeake Bay VA CBST cvi 0.09 1.6 22.5 2.03 23.2 Chincoteague B VA CBCI cvi 0.12 4.5 2.23 14.3 1.86 22.3 Quinby Inlet VA QIUB cvi 0.13 11.1 2.13 28.6 1.76 8.6 Roanoke Sound NC RSJC cvi 0.04 24.7 2.16 10.6 2.4 4.1 Pamlico Sound NC PSWB cvi 0.07 1.93 7.9 2.56 2.59 Charleston Hrb. SC CHFJ <td>Delaware Bay DE</td> <td>DBKI</td> <td>cvi</td> <td></td> <td></td> <td></td> <td>36.3</td> <td></td> <td>23.3</td>	Delaware Bay DE	DBKI	cvi				36.3		23.3
Chesapeake Bay MD CBHG cvi 0.04 3.96 17.7 3.06 13.5 Chesapeake Bay VA CBIB cvi 0.03 33.3 3.1 8.5 3.8 6.9 Chesapeake Bay VA CBCC cvi 0.08 12.5 2.76 11.6 1.76 8.6 Chesapeake Bay VA CBST cvi 0.09 1.6 22.5 2.03 23.2 Chincoteague B VA CBCI cvi 0.12 4.5 2.23 14.3 1.86 22.3 Chincoteague B VA CBCI cvi 0.12 4.5 2.23 14.3 1.86 22.3 Quinby Inlet VA QIUB cvi 0.13 11.1 2.13 28.6 1.76 8.6 Roanoke Sound NC RSJC cvi 0.04 24.7 2.16 10.6 2.4 4.1 Pamlico Sound NC PSWB cvi 0.07 1.93 7.9 2.56 2.59 Cape Fear NC CHFJ	Chesapeake Bay MD		cvi					3.6	
Chesapeake Bay VA CBIB cvi 0.03 33.3 3.1 8.5 3.8 6.9 Chesapeake Bay VA CBCC cvi 0.08 12.5 2.76 11.6 1.76 8.6 Chesapeake Bay VA CBST cvi 0.09 1.6 22.5 2.03 23.2 Chincoteague B VA CBCI cvi 0.12 4.5 2.23 14.3 1.86 22.3 Quinby Inlet VA QIUB cvi 0.13 11.1 2.13 28.6 1.76 8.6 Roanoke Sound NC RSJC cvi 0.04 24.7 2.16 10.6 2.4 4.1 Pamlico Sound NC PSWB cvi 0.09 19.2 2.09 26.5 2.56 25.9 Cape Fear NC CFBI cvi 0.07 1.93 7.9 2.56 5.9 Charleston Hrb. SC CHSF cvi 0.06 1.76 14.2 2.2 9 Charleston Hrb. SC CHSF			cvi		77.6	5.76			
Chesapeake Bay VA CBCC cvi 0.08 12.5 2.76 11.6 1.76 8.6 Chesapeake Bay VA CBST cvi 0.09 1.6 22.5 2.03 23.2 Chincoteague B VA CBCI cvi 0.12 4.5 2.23 14.3 1.86 22.3 Quinby Inlet VA QIUB cvi 0.13 11.1 2.13 28.6 1.76 8.6 Roanoke Sound NC RSJC cvi 0.04 24.7 2.16 10.6 2.4 4.1 Pamlico Sound NC PSWB cvi 0.09 19.2 2.09 26.5 2.56 25.9 Cape Fear NC CFBI cvi 0.07 1.93 7.9 2.56 5.9 Charleston Hrb. SC CHFJ cvi 0.06 1.76 14.2 2.2 9 Charleston Hrb. SC CHSF cvi 0.06 16.6 1.2 2.8 10.7 Savannah R. Est. GA SRTI cvi	Chesapeake Bay MD		cvi						
Chesapeake Bay VA CBST cvi 0.09 1.6 22.5 2.03 23.2 Chincoteague B VA CBCI cvi 0.12 4.5 2.23 14.3 1.86 22.3 Quinby Inlet VA QIUB cvi 0.13 11.1 2.13 28.6 1.76 8.6 Roanoke Sound NC RSJC cvi 0.04 24.7 2.16 10.6 2.4 4.1 Pamlico Sound NC PSWB cvi 0.09 19.2 2.09 26.5 2.56 25.9 Cape Fear NC CFBI cvi 0.07 1.93 7.9 2.56 5.9 Charleston Hrb. SC CHFJ cvi 0.06 1.76 14.2 2.2 9 Charleston Hrb. SC CHSF cvi 0.06 16.6 1.2 2.8 10.7 Savannah R. Est. GA SRTI cvi 0.03 45.8 1.13 5 2.7 23.1 Sapelo Sound GA SSSI cvi									
Chincoteague B VA CBCI cvi 0.12 4.5 2.23 14.3 1.86 22.3 Quinby Inlet VA QIUB cvi 0.13 11.1 2.13 28.6 1.76 8.6 Roanoke Sound NC RSJC cvi 0.04 24.7 2.16 10.6 2.4 4.1 Pamlico Sound NC PSWB cvi 0.09 19.2 2.09 26.5 2.56 25.9 Cape Fear NC CFBI cvi 0.07 1.93 7.9 2.56 5.9 Charleston Hrb. SC CHFJ cvi 0.06 1.76 14.2 2.2 9 Charleston Hrb. SC CHSF cvi 0.06 16.6 1.2 2.8 10.7 Savannah R. Est. GA SRTI cvi 0.03 45.8 1.13 5 2.7 23.1 Sapelo Sound GA SSSI cvi 0.07 41.9 1.26 9.1 2.36 19 St. Johns River FL MRCB					12.5				
Quinby Inlet VA QIUB cvi 0.13 11.1 2.13 28.6 1.76 8.6 Roanoke Sound NC RSJC cvi 0.04 24.7 2.16 10.6 2.4 4.1 Pamlico Sound NC PSWB cvi 0.09 19.2 2.09 26.5 2.56 25.9 Cape Fear NC CFBI cvi 0.07 1.93 7.9 2.56 5.9 Charleston Hrb. SC CHFJ cvi 0.06 1.76 14.2 2.2 9 Charleston Hrb. SC CHSF cvi 0.06 16.6 1.2 2.8 10.7 Savannah R. Est. GA SRTI cvi 0.03 45.8 1.13 5 2.7 23.1 Sapelo Sound GA SSSI cvi 0.07 41.9 1.26 9.1 2.36 19 St. Johns River FL MRCB cvi 0.07 65.4 1.05 11.4 1.9 22.9									
Roanoke Sound NC RSJC cvi 0.04 24.7 2.16 10.6 2.4 4.1 Pamlico Sound NC PSWB cvi 0.09 19.2 2.09 26.5 2.56 25.9 Cape Fear NC CFBI cvi 0.07 1.93 7.9 2.56 5.9 Charleston Hrb. SC CHFJ cvi 0.06 1.76 14.2 2.2 9 Charleston Hrb. SC CHSF cvi 0.06 16.6 1.2 2.8 10.7 Savannah R. Est. GA SRTI cvi 0.03 45.8 1.13 5 2.7 23.1 Sapelo Sound GA SSSI cvi 0.07 41.9 1.26 9.1 2.36 19 St. Johns River FL MRCB cvi 0.07 65.4 1.05 11.4 1.9 22.9									
Pamlico Sound NC PSWB cvi 0.09 19.2 2.09 26.5 2.56 25.9 Cape Fear NC CFBI cvi 0.07 1.93 7.9 2.56 5.9 Charleston Hrb. SC CHFJ cvi 0.06 1.76 14.2 2.2 9 Charleston Hrb. SC CHSF cvi 0.06 16.6 1.2 2.8 10.7 Savannah R. Est. GA SRTI cvi 0.03 45.8 1.13 5 2.7 23.1 Sapelo Sound GA SSSI cvi 0.07 41.9 1.26 9.1 2.36 19 St. Johns River FL SJCB cvi 0.1 9.9 1.5 0.3 2.26 14.1 Matanzas River FL MRCB cvi 0.07 65.4 1.05 11.4 1.9 22.9									
Cape Fear NC CFBI cvi 0.07 1.93 7.9 2.56 5.9 Charleston Hrb. SC CHFJ cvi 0.06 1.76 14.2 2.2 9 Charleston Hrb. SC CHSF cvi 0.06 16.6 1.2 2.8 10.7 Savannah R. Est. GA SRTI cvi 0.03 45.8 1.13 5 2.7 23.1 Sapelo Sound GA SSSI cvi 0.07 41.9 1.26 9.1 2.36 19 St. Johns River FL SJCB cvi 0.1 9.9 1.5 0.3 2.26 14.1 Matanzas River FL MRCB cvi 0.07 65.4 1.05 11.4 1.9 22.9									
Charleston Hrb. SC CHFJ cvi 0.06 1.76 14.2 2.2 9 Charleston Hrb. SC CHSF cvi 0.06 16.6 1.2 2.8 10.7 Savannah R. Est. GA SRTI cvi 0.03 45.8 1.13 5 2.7 23.1 Sapelo Sound GA SSSI cvi 0.07 41.9 1.26 9.1 2.36 19 St. Johns River FL SJCB cvi 0.1 9.9 1.5 0.3 2.26 14.1 Matanzas River FL MRCB cvi 0.07 65.4 1.05 11.4 1.9 22.9					19.2				
Charleston Hrb. SC CHSF cvi 0.06 16.6 1.2 2.8 10.7 Savannah R. Est. GA SRTI cvi 0.03 45.8 1.13 5 2.7 23.1 Sapelo Sound GA SSSI cvi 0.07 41.9 1.26 9.1 2.36 19 St. Johns River FL SJCB cvi 0.1 9.9 1.5 0.3 2.26 14.1 Matanzas River FL MRCB cvi 0.07 65.4 1.05 11.4 1.9 22.9									
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Sapelo Sound GA SSSI cvi 0.07 41.9 1.26 9.1 2.36 19 St. Johns River FL SJCB cvi 0.1 9.9 1.5 0.3 2.26 14.1 Matanzas River FL MRCB cvi 0.07 65.4 1.05 11.4 1.9 22.9							_		
St. Johns River FL SJCB cvi 0.1 9.9 1.5 0.3 2.26 14.1 Matanzas River FL MRCB cvi 0.07 65.4 1.05 11.4 1.9 22.9									
Matanzas River FL MRCB cvi 0.07 65.4 1.05 11.4 1.9 22.9									
Biscayne Bay FL BBPC cvi 0.12 32.7 0.6 20.8 1.86 32.7									
	Biscayne Bay FL	BBPC	CVÍ	0.12	32.7	0.6	20.8	1.86	32.7

Concentrations (ug/g dry weight) of Mercury (Hg) Nickel (Ni) and Selenium (Se) in bivalves collected during 1986 at Gulf Coast Sites

Location	Codo	Constan	Llin		A 42	- 0/		
Location	Code	Species	Hg	c.v.%	Ni	c.v.%	Se	c.v.%
Everglades FL	EVFU	CVi	0.24	22.3	1.63	33.7	1.86	12.3
Rookery Bay FL	RBHC	CVİ	0.23	24.7	1.21	39	1.8	20
Naples Bay FL	NBNB	cvi	0.15	11.5	0.63	31.9	1.23	12.3
Charlotte Harbor FL	CBBI	cvi	0.31	9.7	1.1	9	1.7	26.9
Tampa Bay FL	TBMK	cvi	0.23	46	1.4	63.4	1.6	12.5
Tampa Bay FL	TBCB	cvi	0.24	11	1.03	14.7	1.13	10.1
Tampa Bay FL	TBHB	cvi	0.1	21.6	1.4		1.76	3.2
Tampa Bay FL	TBPB	cvi	0.48	21.5	1.8	33.7	1.03	24.3
Cedar Key FL	CKBP	cvi	0.1	5.4	0.55	31.4	1.36	4.2
Apalachicola Bay FL	APCP	cvi	0.11	15.7	0.86	24	2	20
Apalachicola Bay FL	APDB	cvi	0.12	9.3	1.46	14.1	1.3	
St. Andrew Bay FL	SAWB	cvi	0.07	17.5	0.93	43.3	1.2	14.4
Choctawhatchee B. FL	CBSP	cvi	0.26	18.4	1.01	41.8	2.76	2
Choctawhatchee B. FL	CBSR	cvi	0.24	6.1	1.3	7.6	3.86	3.9
Pensacola Bay FL	PBIB	cvi	0.24	45.4	1.66	13.8	2.4	14.4
Mobile Bay AL	MBCP	cvi	0.07		2.3	7.5	1.63	7
Mississippi Sound MS	MSPB	cvi	0.16	18.7	2.3	11.5	2.06	26.6
Mississippi Sound MS	MSBB	cvi	0.13	33.7	2.43	10.3	1.93	18.1
Mississippi Sound MS	MSPC	cvi	0.1	7.5	2.4	15	2.26	2.5
Lake Borgne LA	LBMP	cvi	0.03	3.3	3.46	6.6	2.56	30.2
Breton Sound LA	BSSI	cvi	0.03	4.4	2.43	11.8	1.73	43.3
Breton Sound LA	BSBG	cvi	0.03	30.6	2.13	5.4	1.96	2.9
Baritaria Bay LA	BBSD	cvi	0.02	2.5	1.36	23.5	0.93	24.7
Barataria Bay LA	BBMB	cvi	0.04	13.5	0.81	7	1	17.3
Terrebonne Bay LA	TBLF	cvi	0.03	21.6	1.63	21.5	1.7	15.5
Terrebonne Bay LA	TBLB	cvi	0.05	14.7	2.03	28.8	1.4	14.2
Caillou Lake LA	CLCL	cvi	0.02	4.4	2.26	2.5	1.53	13.5
Atchafalaya Bay LA	ABOB	cvi	0.04	8.7	1.66	9.1	2.06	7.3
Vermillion Bay LA	VB\$P	cvi	0.03	2.5	2.03	5.6	2.23	18.6
Joseph Hrb. Bayou LA	JHJH	cvi	0.04	26.6	2.09	16.4	2.13	19.5
Calcasieu Lake LA	CLSJ	cvi	0.11	22	2.6	13.3	2.3	11.5
Sabine Lake TX	SLBB	cvi	0.14	8	3.4	10.6	2.53	28
Galveston Bay TX	GBHR	cvi	0.04	15	1.7	40.7	2.86	2
Galveston Bay TX	GBYC	cvi	0.07	39.6	2.56	17.5	3	8.8
Galveston Bay TX	GBTD	cvi	0.05	5.5	2.13	14.3	3.5	4.9
Galveston Bay TX	GBCR	cvi	0.06	26	1.66	6.9	2.83	8.1
Matagorda Bay TX	MBEM	cvi	0.06	38.1	3.23	9.4	4.06	9.9
Matagorda Bay TX	MBTP	cvi	0.32	17	1.56	3.6	2.09	12.5
Matagorda Bay TX	MBGP	cvi	0.36	3.1	2.53	4.5	2.96	15.9
Matagorda Bay TX	MBLR	cvi	0.19	43.2	12.56	127	2	13:2
Espiritu Santo TX	ESSP	cvi	0.11	74.4	3.3	57.8	5.03	59.6
San Antonio Bay TX	SAMP	cvi	0.05	10.8	3.36	1.7	3.76	19.9
San Antonio Bay TX	SAPP	cvi	0.04	20.9	3.1	19.3	3.26	7.7
Mesquite Bay TX	MBAR	cvi	0.08	17.3	2.36	4.8	3.43	7.3
Copano Bay TX	CBCR	cvi	0.14	35.3	3.83	19.9	4.46	20
Aransas Bay TX	ABLR	cvi	0.1	9.9	3.33	14.7	5.66	5
Corpus Christi TX	CCIC	cvi	0.04	62.4	1.23	12.3	2.83	4
Corpus Christi TX	CCNB	cvi	0.13	18.4	1.96	7.7	2.53	24.1
Lower Laguna MadTX	LMSB	cvi	0.13	13.3	1.33	4.3	2.86	25.7
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Concentrations (ug/g dry weight) of Mercury (Hg) Nickel (Ni) and Selenium (Se) in bivalves collected during 1986 at West Coast Sites

Location .	Code S	Species	Hg	c.v.%	Ni	c.v.%	Se d	.v.%
Imperial Beach CA	IBIB	mca	0.09	22.3	0.92	26.6	2.43	14.4
San Diego Bay CA	SDHI	med	0.19	13.9	2.53	20.2	3.2	21.6
Point Loma CA	PLLH	mca	0.26	21.3	1.83	17.5	3.16	4.8
Mission Bay CA	MBVB	med	0.11	13.4	2.33	73.2	2.56	15.7
La Jolla CA	LJLJ	mca	0.22	10.1	1.43	17.5	3.66	7.8
Oceanside CA	OSBJ	med	0.09	47.7	1.7	10.1	2.03	5.6
Newport Beach CA	NBBC	mca	0.07	64.3	1.3	7.6	2.53	12
Anaheim Bay CA	ABWJ	mca	0.11	15.7	1.28	22.3	2.5	18.3
San PedroHbr CA	SPFP	med	0.07	62.5	2.03	7.5	2.5	13.9
Palos Verdes CA	PVRP	mca	0.04	02.0	0.86		1.23	.0.0
Santa Cruz Island CA	SCFP	mca	0.11	18.3	2.63	10.9	2.96	10.8
Marina Del Ray CA	MDSJ	med	0.17	56.9	2.93	5.2	4.76	3.2
Pt. Dume CA	PDPD	mca	0.16	15.4	2.46	4.6	3.63	33.2
Santa Catalina I. CA	SCBR	mca	0.14	18.8	2.26	10.1	3.86	16.8
Pt. Santa Barbara CA	SBSB	mca	0.09	6.1	3.06	9.9	2.7	11.1
Pt. Conception CA	PCPC	mca	0.11	9	2.43	37	4.56	7
San Luis Obispo B. CA	SLSL	mca	0.06	45.8	3.13	22.6	1.76	18.1
San Simeon Point CA	SSSS	mca	0.11	20.3	5.23	6.7	2.86	16.1
Pacific Grove CA	PGLP	mca	0.09	37.6	1.8	20	2.7	19.2
Monterey Bay CA	MBSC	mca	0.14	0	2.56		2.9	
San Francisco Bay CA	SFDB	med	0.27	18.5	3.9	9.2	2.73	9.2
San Francisco Bay CA	SFSM	med	0.27	9.7	3.33	6.2	2.09	29.7
Tomales Bay CA	TBSR	med	0.28	17.4	6.56	9.7	2.43	13.2
Bodega Bay CA	BBBE	mca	0.12	9.3	4	9	3.76	10.7
Point Arená CA	PAPA	mca	0.19	41.4	4.03	7.5	2.9	3.4
Pt. Delgada CA	PDSC	mca	0.17	25.5	3.1	19.6	4	18
Humboldt Bay CA	HMBJ	mca	0.07	45.8	3.46	18.7	2.03	10.2
Point St. George CA	SGSG	mca	0.11	39.6	6.43	23.7	2.86	13.2
Coos Bay OR	CBCH	mca	0.12	8.3	3.26	4.6	2.36	8.7
Coos Bay OR	CBRP	med	0.14	3.9	2.93	3.9	2.9	11.9
Yaquina Bay OR	YBOP	med	0.15	7.5	3.1	5.5	3.5	8.5
Yaquina Head OR	YHYH	mca	0.09	6.1	4	24.1	2.53	6
Tillamook Bay OR	TBHP	med	0.08	6.9	2.56	4.4	2.9	6.8
Columbia River OR	CRSJ	med	0.09		2	10	3.03	5_
Gray's Harbor WA	GHWJ	mca	0.05	10.8	2.33	17.8	2.63	8.7
Str. Juan de Fuca WA	JFCF	mca	0.11	17.8	1.7	10.1	2.76	7.5
South Puget Sound WA	SSBI	med	0.13	8.4	0.79	11	1.96	30.6
Commencement B WA	CBTP	med	0.19	18.9	1.7	23.5	2.6	
Elliott Bay WA	EBFR	med	0.19	12.7	1.63	3.5	2.2	20.8
Sinclair Inlet WA	SIWP	med	0.11	9.8	1.14	21.2	2.7	28.9
Whidbey Island WA	WIPP	med	0.08	17.6	3.06	9.4	3.1	8.5
Bellingham Bay WA	BBSM	med	0.28	5.3	4.63	9.7	3.03	8.2
Point Roberts WA	PRPR	med	0.1	20_	3.66	15.9	3.16	21
Unakwit Inlet AK	UISB	med	0.09	57.7	2.2	474	4.6	4.3
Port Valdez AK	PVMC	med	0.06	44	2.63	17.1	3.73	12.6
Barber's Point HI	BPBP	osa	0.41	2.4	2.66	34	7.06	28.3
Honolulu Harbor HI	HHKL	osa	0.28	34	1.17	32.2	8.16	31.7

Concentrations (ug/g dry weight) of Silver (Ag) Thallium (TI) and Tin (Sn) in bivalves collected during 1986 at East Coast Sites

Location	Code	Species	Ag	c.v.%	TI c.v.%	Sn	c.v.%
Penobscot Bay ME	PB\$I	med	0.14	12.3	nd	0.03	77.8
Penobscot Bay ME	PBPI	med	0.01		nd	0.01	91.6
Boston Harbor MA	BHDI	med	1.73	8.8	nd	0.33	18.9
Boston Harbor MA	BHDB	med	1.4	25.7	nd	0.33	3
Boston Harbor MA	BHHB	med	1.2	14.4	nd	0.12	88.1
Boston Harbor MA	BHBI	med	1.46	3.9	nd	0.17	5.8
Buzzards Bay MA	BBRH	med	0.34	2.9	nd	0.05	20.3
Buzzards Bay MA	BBAR	med	0.19	21.5	nd	0.11	4.9
Buzzards Bay MA	BBGN	med	0.06		nd	0.03	
Narragansett Bay RI	NBCI	med	0.05	47.1	nd	0.14	7.1
Narragansett Bay RI	NBDI	med	0.25	3.9	nd	0.17	29.4
Long Island Snd CT	LICR	med	0.23	27.8	nd	0.22	31.8
Long Island Snd CT	LINH	med	0.22	4.5	nd	0.18	8.1
Long Island Snd CT	LIHR	med	0.49	13	nd	0.16	18.7
Long Island Snd CT	LISI	med	0.09	11.9	nd	0.09	19.2
Long Island Snd NY	LIMR	med	0.3	9.9	nd	0.2	15
Long Island Snd NY	LIHH	med	0.35	5.7	nd	0.16	6.9
Long Island Snd NY	LITN	med	0.35	8	nd	0.26	39.9
Long Island Snd NY	LIHU	med	0.19	10.5	nd	0.16	6.9
Long Island Snd NY	LIPJ	med	0.1	14.3	nd	0.13	4.2
Moriches Bay NY	MBTH	med	0.42	7.2	nd	0.08	54.5
Hud/Rar Estuary NY	HRJB	med	0.46	16.4	nd	0.2	7.5
Hud/Rar Estuary NY	HRUB	med	1.95	29.5	nd	1.59	55.1
Hud/Rar Estuary NY	HRLB	med	1.26	4.5	nd	0.48	10.5
New York Bight NJ	NYSH	med	0.67	6.1	nd	0.35	7
New York Bight NJ	NYLB	med	0.29	12.7	nd	0.23	14.8
New York Bight NJ	NYSR	med	0.19	11.9	nd	0.24	2.3
Delaware Bay DE	DBFE	cvi	4.06	58.6	nd	0.06	31.2
Delaware Bay DE	DBBD	cvi	4.16	21.7	nd	0.09	6.1
Delaware Bay DE	DBAP	cvi	3.86	33.2	nd	0.03	33.3
Delaware Bay DE	DBKI	cvi	6.66	58.1	nd	0.07	77.5
Chesapeake Bay MD	CBMP	cvi	6.86	5.8	nd	0.26	7.9
Chesapeake Bay MD	CBHP	cvi	4.83	7.8	nd	0.15	63.5
Chesapeake Bay MD	CBHG	cvi	1.8	9.6	nd -	0.12	9.3
Chesapeake Bay VA	CBIB	cvi	0.92	6.5	nd	0.03	17.3
Chesapeake Bay VA	CBCC	cvi	0.38	1.5	nd	0.02	24.7
Chesapeake Bay VA	CBST	cvi	2.46	6.1	nd	0.06	9.1
Chincoteague Bay VA	CBCI	cvi	4 ·	38.4	nd	0.07	14.2
Quinby Inlet VA	QIUB	cvi	4.83	75.7	nd	0.04	50
Roanoke Sound NC	RSJC	cvi	1.4	0	nd	0.01	
Pamlico Sound NC	PSWB	cvi	1.7	5.8	nd	0.02	89.2
Cape Fear NC	CFBI	cvi	2.5	10.5	nd	0.06	17.3
Charleston Hrb. SC	CHFJ	cvi	4.03	11.4	nd	0.18	44 .
Charleston Hrb. SC	CHSF	cvi	3.53	4.3	nd	0.25	23.8
Savannah R. Est. GA	SRTI	cvi	1.56	9.7	nd	0.07	92.5
Sapelo Sound GA	SSSI	cvi	1.8	40	nd	nd	
St. Johns River FL	SJCB	cvi	0.83	16.8	nd	0.29	22.6
Matanzas River FL	MRCB	CVİ	1.76	49.8	nd	0.05	87.1
Biscayne Bay FL	BBPC	cvi	1.53	16.4	nd	0.01	

Concentrations (ug/g dry weight) of Silver (Ag) Thallium (TI) and Tin (Sn) in bivalves collected during 1986 at Gulf Coast Sites

Location	Code	Species	Ag	c.v.%		%	Sn 0.05	c.v.%
Everglades FL	EVFU	cvi	0.7	24.7	nd ·		nd	
Rookery Bay FL	RBHC	cvi	1.56	25.7	nd 0 Ee	61.3	0.58	61.3
Naples Bay FL	NBNB	CVİ	4 1.53	10.8 7.5	0.58 nd	01.3	0.05	01.0
Charlotte Harbor FL	CBBI	cvi	0.63	39.7	nd		nd	
Tampa Bay FL	TBMK	cvi	0.63	20.8	nd		nd	
Tampa Bay FL	TBCB	cvi cvi	0.73	24.1	nd	•	0.12	90.1
Tampa Bay FL	TBHB		2.3	15.6	nd		nd	00
Tampa Bay FL	TBPB CKBP	cvi cvi	0.33	17.3	nd		nd	
Cedar Key FL	APCP	cvi	1.23	41.6	nd		nd	
Apalachicola Bay FL	APDB	cvi	2.4	4.1	nd		nd	
Apalachicola Bay FL	ŞAWB	cvi	1.7	10.1	nd		0.07	
St. Andrew Bay FL Choctawhatchee B. FL	CBSP	cvi	4.3	24.2	nd ·		nd	
	CBSR	cvi	3.7	18.7	nd		nd	
Choctawhatchee B. FL	PBIB	cvi	1.33	11.4	nd		nd	
Pensacola Bay FL	MBCP	cvi	2.2	4.5	nd		nd	
Mobile Bay AL	MSPB	CVI	3.16	30	nd		nd	
Mississippi Sound MS	MSBB	cvi	2.86	26.6	nd		0.23	87.9
Mississippi Sound MS	MSPC	cvi	3.9	24.4	nd		nd nd	·
Mississippi Sound MS	LBMP	cvi	1.83	22	nd		nd	
Lake Borgne LA	BSSI	cvi	1.26	18.2	nd		0.07	
Breton Sound LA Breton Sound LA	BSBG	cvi	0.89	11.1	nd		nd	
Baritaria Bay LA	BBSD	cvi	0.56	40.7	nd		nd	
Barataria Bay LA	BBMB	cvi	0.23	24.7	nd		nd	
Terrebonne Bay LA	TBLF	cvi	0.5	34.6	nd		0.13	
Terrebonne Bay LA	TBLB	cvi	0.36	31.4	nd		nd	
Caillou Lake LA	CLCL	cvi	0.73	7.8	nd		nd	
Atchafalaya Bay LA	ABOB	cvi	1.46	20.8	nd		nd	
Vermillion Bay LA	VBSP	cvi	5	10	nd		0.06	
Joseph Hbr. Bayou LA	JHJH	cvi	2.56	25.9	nd		0.36	90.7
Calcasieu Lake LA	CLSJ	cvi	2	21.7	nd		nd	
Sabine Lake TX	SLBB	cvi	2.66	24.9	nd		nd	
Galveston Bay TX	GBHR	cvi	2	4.9	nd		nd	
Galveston Bay TX	GBYC	cvi	0.96	29.8	nd		nd	
Galveston Bay TX	GBTD	cvi	1.66	15	nd		nd	
Galveston Bay TX	GBCR	cvi	2.96	18.5	nd		nd	
Matagorda Bay TX	MBEM	cvi	4.66	12.3	nd		nd	
Matagorda Bay TX	MBTP	cvi	0.42	7.2	nd		0.08	54.4
Matagorda Bay TX	MBGP	cvi	1.53	3.7	nd		0.07	
Matagorda Bay TX	MBLR	cvi	1.96		nd		nd	
Espiritu Santo TX	ESSP	cvi	5.06		nd		nd	
San Antonio Bay TX	SAMP	cvi	5.16		nd		nd	
San Antonio Bay TX	SAPP	cvi	3.73	36.3	nd		nd	
Mesquite Bay TX	MBAR	cvi	2.03	24.2	nd		nd	
Copano Bay TX	CBCR	cvi	7	7.1	nd		nd	
Aransas Bay TX	ABLR	cvi	4.66	12.3	nd		nd	
Corpus Christi TX	CCIC	cvi	0.73	15.7	nd		0.1	88.6
Corpus Christi TX	CCNB	cvi	2.6	3.8	nd		nd	
Lower Laguna MadTX	LMSB	cvi	1.73	3.3	nd		nd	
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Concentrations (ug/g dry weight) of Silver (Ag) Thallium (TI) and Tin (Sn) in bivalves collected during 1986 at West Coast Sites

Imperial Beach CA	Location	Code	Species	Ag	c.v%	TI	c.v.%	Sn c.v.%
San Diego Bay CA SDHI med 0.09 21.5 0.43 13.1 nd Point Loma CA PLLH mca 1.16 4.9 0.28 8.8 nd Mission Bay CA MBVB med 0.11 48.1 0.38 1.5 nd La Jolla CA LJLJ mca 1.63 15.4 0.42 13.6 nd Oceanside CA OSBJ med 0.67 158.9 nd nd nd Newport Beach CA NBBC mca 1.4 7.1 nd nd nd Newport Beach CA NBBC mca 1.4 7.1 nd nd nd Newport Beach CA NBBC mca 1.4 7.1 nd nd nd Newport Beach CA NBBC mca 1.63 15.2 nd nd Anal San Francise CA PVRP mca 0.31 12.4 nd nd San Francisco Bay CA MDSJ mca<	Imperial Beach CA		-					
Point Loma CA PLLH mca 1.16 4.9 0.28 8.8 nd Mission Bay CA MBVB med 0.11 48.1 0.38 1.5 nd La Jolla CA LJLJ mca 1.63 15.4 0.42 13.6 nd Oceanside CA OSBJ med 0.67 158.9 nd nd Newport Beach CA NBBC mca 1.4 7.1 nd nd Newport Beach CA NBBC mca 1.4 7.1 nd nd Newport Beach CA NBBC mca 1.4 7.1 nd nd Newport Beach CA NBBC mca 1.4 7.1 nd nd Newport Beach CA NBBC mca 1.4 7.1 nd nd Anal Catalina I. CA SEPFP med 0.04 15.8 nd nd Pt. Dance CA PDPD mca 0.56 27.8 0.35 4.9 nd <		_						_
Mission Bay CA MBVB med 0.11 48.1 0.38 1.5 nd La Jolla CA LJLJ mca 1.63 15.4 0.42 13.6 nd Oceanside CA OSBJ med 0.67 158.9 nd nd Newport Beach CA NBBC mca 1.4 7.1 nd nd Anaheim Bay CA ABWJ mca 0.31 22.4 nd nd San PedroHbr CA SPFP med 0.04 15.8 nd nd Palos Verdes CA PVRP mca 0.5 nd nd nd Palos Verdes CA PVRP mca 0.5 nd nd nd Palos Verdes CA PVRP mca 0.5 nd nd nd Palos Verdes CA PVRP mca 0.36 33 0.1 nd Palos Road CA MDSJ med 0.74 22.9 nd nd Pt. Dume CA <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>_</td></td<>								_
La Jolla CA			_					_
Oceanside CA OSBJ med 0.67 158.9 nd nd Newport Beach CA NBBC mca 1.4 7.1 nd nd Anaheim Bay CA ABWJ mca 0.31 22.4 nd nd San PedroHbr CA SPFP med 0.04 15.8 nd nd Palos Verdes CA PVRP mca 0.5 nd nd Palos Verdes CA PVRP mca 0.5 nd nd Santa Cruz Island CA SCFP mca 0.36 33 0.1 nd Marina Del Ray CA MDSJ med 0.74 22.9 nd nd Pt. Dume CA PDPD mca 1.83 6.2 nd nd Pt. Dume CA PDPD mca 0.56 27.8 0.35 4.9 nd Pt. Santa Barbara CA SBSB mca 0.56 37.4 0.36 4.2 nd Pt. Conception CA PCPC mca 0.66 27.3 0.36 14.4 nd San Luis Obispo B. CA SLSL mca								
Newport Beach CA NBBC mca 1.4 7.1 nd nd Anaheim Bay CA ABWJ mca 0.31 22.4 nd nd San PedroHbr CA SPFP med 0.04 15.8 nd nd Palos Verdes CA PVRP mca 0.5 nd nd nd Palos Verdes CA PVRP mca 0.5 nd nd nd Palos Verdes CA PVRP mca 0.5 nd nd nd Palos Verdes CA PVRP mca 0.5 nd nd nd Palos Verdes CA PVRP mca 0.36 33 0.1 nd nd Malos Verdes CA PVRP mca 0.36 33 0.1 nd nd Malos Verdes CA MDSD med 0.74 22.9 nd nd nd nd nd nd nd nd nd nd nd nd nd nd							15.0	
Anaheim Bay CA						_		
San PedroHbr CA SPFP med 0.04 15.8 nd nd nd Palos Verdes CA PVRP mca 0.5 nd nd nd Santa Cruz Island CA SCFP mca 0.36 33 0.1 nd nd nd Marina Del Ray CA MDSJ med 0.74 22.9 nd nd nd Pt. Dume CA PDPD mca 1.83 6.2 nd nd nd Pt. Dume CA PDPD mca 1.83 6.2 nd nd nd Pt. Dume CA PDPD mca 1.83 6.2 nd nd nd Pt. Santa Barbara CA SBSB mca 0.56 27.8 0.35 4.9 nd nd Pt. Conception CA PCPC mca 0.56 37.4 0.36 4.2 nd nd Pt. Conception CA PCPC mca 0.66 27.3 0.36 14.4 nd nd San Luis Obispo B. CA SLSL mca 0.23 13.7 0.18 87.3 nd nd San Simeon Point CA SSSS mca 0.18 47 0.34 6 nd nd Pacific Grove CA PGLP mca 0.09 16.3 0.31 12.7 nd nd Monterey Bay CA MBSC mca 0.56 0.28 nd nd San Francisco Bay CA						_		
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Coos Bay OR CBCH mca 0.02 24.7 nd n n4 25 2							7.1	
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Coos Bay OR CBRP med 0.05 20 nd 0.11 27.2						nd		
Yaquina Bay OR YBOP med 0.03 33.3 nd 0.05 36.7						nd		
Yaquina Head OR YHYH mca 0.03 15.7 nd 0.04 44.6								0.04 44.6
Tillamook Bay OR TBHP med 0.01 43.3 nd 0.01 97.7					43.3			0.01 97.7
Columbia River OR CRSJ med nd nd 0.04 25						nd		0.04 25
Gray's Harbor WA GHWJ mca 0.01 84.5 nd nd			mca	0.01		nd		nd
Str. Juan de Fuca WA			mca	0.03		nd		0.04 102.8
South Puget Sound WA SSBI med 0.11 32.7 nd 0.08 40.5			med	0.11		nd		0.08 40.5
Commencement B WA CBTP med 0.08 13.3 nd 0.03 nd			med			nd		0.03 nd
Elliott Bay WA EBFR med 0.62 28.5 nd 0.14 32.7						nd		0.14 32.7
Sinclair Inlet WA SIWP med 0.07 20.8 nd 0.06 39.7			med	0.07	20.8	nd		0.06 39.7
Whidbey Island WA WIPP med 0.07 24.7 nd 0.01 32.8			med	0.07	24.7	nd		0.01 32.8
Bellingham Bay WA BBSM med 0.01 34.6 nd 0.1 24.3		BBSM	med	0.01	34.6	nd		0.1 24.3
Point Roberts WA PRPR med 0.01 89.5 nd 0.03 88.1		PRPR	med	0.01	89.5	nd		
Unakwit Inlet AK UISB med 0.02 24.7 nd 0.01 82.3			med					
Port Valdez AK PVMC med nd nd 0.05 47.1			med	nd				
Barber's Point HI BPBP osa. 1.73 21.8 0.05 nd			osa.	1.73	21.8	0.05		
Honolulu Harbor HI HHKL osa. 6.96 39.5 nd nd	Honolulu Harbor HI	HHKL	osa.	∠6.96	39.5	nd		

Concentrations (ug/g dry weight) of Zinc(Zn) in bivalves collected during 1986 at East Coast Sites

Location	Code	Species	Zn	c.v.%
Penobscot Bay ME	PBSI	med	98	1.5
Penobscot Bay ME	PBPI	med	78	10.9
Boston Harbor MA	BHDI	med	136	11.1
Boston Harbor MA	BHDB	med	136	8.4
Boston Harbor MA	BHHB	med	113	10.1
Boston Harbor MA	BHBI	med	110	
Buzzards Bay MA	BBRH	med	107	18.3
Buzzards Bay MA	BBAR	med	104	4.9
Buzzards Bay MA	BBGN	med	53	
Narragansett Bay RI	NBCI	med	92	2.2
Narragansett Bay RI	NBDI	med	113	10.1
Long Island Snd CT	LICR	med	146	20.8
Long Island Snd CT	LINH	med	106	5.4
Long Island Snd CT	LIHR	med	115	8
Long Island Snd CT	LISI	med	97	4.7
Long Island Snd NY	LIMR	med	143	8
Long Island Snd NY	LIHH	med	140	7.1
Long Island Snd NY	LITN	med	136	11.1
Long Island Snd NY	LIHU	med	106	6.5
Long Island Snd NY	LIPJ	med	110	9
Moriches Bay NY	MBTH	med	73	3.6
Hud/Rar Estuary NY	HRJB	med	84	5.9
Hud/Rar Estuary NY	HRUB	med	133	4.3
Hud/Rar Estuary NY	HRLB	med	93	.6
New York Bight NJ	NYSH	med	143	26.4
New York Bight NJ	NYLB	med	95	2.1
New York Bight NJ	NYSR	med	90	6.9
Delaware Bay DE	DBFE	cvi	6000	
Delaware Bay DE	DBBD	cvi	7533	4.2
Delaware Bay DE	DBAP	cvi	13000	13.3
Delaware Bay DE	DBKI	cvi	7666	19.9
Chesapeake Bay MD	CBMP	cvi	5500	7.9
Chesapeake Bay MD	CBHP	cvi	4733	9.5
Chesapeake Bay MD	CBHG	cvi	3700	12.3
Chesapeake Bay VA	CBIB	cvi	3100	11.6
Chesapeake Bay VA	CBCC	cvi	1133	5
Chesapeake Bay VA	CBST	cvi	2700	16.1
Chincoteague Bay VA	CBCI	cvi	4000	
Quinby Inlet VA	QIUB	cvi	4000	
Roanoke Sound NC	RSJC	cvi	3000	
Pamlico Sound NC	PSWB	cvi	1666	34.6
Cape Fear NC	CFBI	cvi	1026	6.2
Charleston Hrb. SC	CHFJ	cvi	1700	5.8
Charleston Hrb. SC	CHSF	cvi	2666	2.1
Savannah R. Est. GA	SRTI	cvi	1000	
Sapelo Sound GA	SSSI	cvi	1000	
St. Johns River FL	SJCB	cvi	3800	13.9
Matanzas River FL	MRCB	cví	2000	
Biscayne Bay FL	BBPC	cvi	2733	12.8

Concentrations (ug/g dry weight) of Zinc(Zn) in bivalves collected during 1986 at Gulf Coast Sites

Location	Code	Species	Zn	c.v.%
Everglades FL	EVFU	cvi	933	35.6
Rookery Bay FL	RBHÇ	cvi	716	32.9
Naples Bay FL	NBNB	cvi	2366	17
Charlotte Harbor FL	CBBI	cvi	1300	13.3
Tampa Bay FL	TBMK	cvi	650	20.3
Tampa Bay FL	TBCB	cvi	1266	16.4
Tampa Bay FL	TBHB	cvi	3600	5.5
Tampa Bay FL	TBPB	cvi	2600	10.1
Cedar Key FL	CKBP	cvi	300	15.2
Apalachicola Bay FL	APCP	cvi	650	15.3
Apalachicola Bay FL	APD8	cvi	433	6.6
St. Andrew Bay FL	SAWB	cvi	5400	3.2
Choctawhatchee B. FL	CBSP	cvi	2966	10.2
Choctawhatchee B. FL	CBSR	cvi	1600	28.6
Pensacola Bay FL	PBIB	cvi	2133	39.8
Mobile Bay AL	MBCP	cvi	916	36.3
Mississippi Sound MS	MSPB	cvi	3233	34
Mississippi Sound MS	MSBB	cvi	3733	14.7
Mississippi Sound MS	MSPC	cvi	1600	6.2
Lake Borgne LA	LBMP	cvi	3400	12.8
Breton Sound LA	BSSI	cvi	1166	9.8
Breton Sound LA	BSBG	cvi	950	9.1
Baritaria Bay LA	BBSD	cvi	916	15.7
Barataria Bay LA	BBMB	cvi	1266	24.1
Terrebonne Bay LA	TBLF	cvi	1800	57.7
Terrebonne Bay LA	TBLB	cvi	1366	4.2
Caillou Lake LA	CLCL	cvi	1333	8.6
Atchafalaya Bay LA	ABOB	cvi	1200	
Vermillion Bay LA	VBSP	cvi	2300	11.5
Joseph Hrb. Bayou LA	JHJH	cvi	1200	14.4
Calcasieu Lake LA	CLSJ	cvi	2600	10.1
Sabine Lake TX	SLBB	cvi	8000	22.5
Galveston Bay TX	GBHR	cvi	1083	11.6
Galveston Bay TX	GBYC	cvi	4566	26.4
Galveston Bay TX	GBTD	cvi	2133	14.3
Galveston Bay TX	GBCR	cvi	2166	26.2
Matagorda Bay TX	MBEM	cvi	883	14.2
Matagorda Bay TX	MBTP	cvi	73	3.6
Matagorda Bay TX	MBGP	cvi	1400	7.1
Matagorda Bay TX	MBLR	cvi	1166	17.8
Espiritu Santo TX	ESSP	cvi	866	43.6
San Antonio Bay TX	SAMP	cvi	1600	12.5
San Antonio Bay TX	SAPP	cvi	733	10.4
Mesquite Bay TX	MBAR	cvi	616	9.3
Copano Bay TX	CBCR	cvi	1800	5.5
Aransas Bay TX	ABLR	cvi	1600	21.6
Corpus Christi TX	CCIC	cvi	2266	17.8
Corpus Christi TX	CCNB	cvi	4933	28.4
Lower Laguna MadTX	LMSB	cvi	1633	9.3

Concentrations (ug/g dry weight) of Zinc(Zn) in bivalves collected during 1986 at West Coast Sites

Leadian	Code	Species	Zn	c.v.%
Location	IBIB	Species	166	3.4
Imperial Beach CA	SDHI	mca med	273	5.5
San Diego Bay CA			196	2.9
Point Loma CA	PLLH	mca	163	19.6
Mission Bay CA	MBVB	med		
La Jolla CA	LJLJ	mca	180	11.1
Oceanside CA	OSBJ	med	163	9.3
Newport Beach CA	NBBC	mca	156	16
Anaheim Bay CA	ABWJ	mca	150	41.6
San PedroHbr CA	SPFP	med	180	24.2
Palos Verdes CA	PVRP	mca	53	
Santa Cruz Island CA	SCFP	mca	153	7.5
Marina Del Ray CA	MDSJ	med	310	8.5
Pt. Dume CA	PDPD	mca	193	7.9
Santa Catalina I. CA	SCBR	mca	133	4.3
Pt. Santa Barbara CA	SBSB	mca	163	12.7
Pt. Conception CA	PCPC	mca	156	3.6
San Luis Óbispo B. CA	SLSL	mca	153	3.7
San Simeon Point CA	SSSS	mca	165	40.5
Pacific Grove CA	PGLP	mca	146	
Monterey Bay CA	MBSC	mca	143	
San Francisco Bay CA	SFDB	med	77	6.8
San Francisco Bay CA	SFSM	med	76	7.5
Tomales Bay CA	TBSR	med	116	13
Bodega Bay CA	BBBE	mca	160	10.8
Point Arena CA	PAPA	mca	163	3.5
Pt. Delgada CA	PDSC	mca	180	20
Humboldt Bay CA	HMBJ	mca	153	7.5
Point St. George CA	SGSG	mca	170	5.8
Coos Bay OR	CBCH	mca	143	. 4
Coos Bay OR	CBRP	med	233	6.5
Yaquina Bay OR	YBOP	med	156	9.7
Yaquina Head OR	YHYH	mca	143	4
Tillamook Bay OR	TBHP	med	100	8.9
Columbia River OR	CRSJ	med	133	4.3
Gray's Harbor WA	GHWJ	mca	150	11.5
Str. Juan de Fuca WA	JFCF	mca	150	11.5
South Puget Sound WA		med	140	
Commencement B WA	CBTP	med	246	23
Elliott Bay WA	EBFR	med	263	17.1
Sinclair Inlet WA	SIWP	med	173	3.3
Whidbey Island WA	WIPP	med	119	1.4
		med	163	7
Bellingham Bay WA Point Roberts WA	BB\$M PRPR	med	166	13.8
	UISB	med	84	4.2
Unakwit Inlet AK	PVMC	med	104	9.4
Port Valdez AK			710	69.5
Barber's Point HI	BPBP	osa	446	37.2
'nnolulu Harbor HI	HHKL	osa	440	31.2

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APPENDIX E. BENTHIC SURVEILLANCE FISH LIVER DATA

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APPENDIX E. BENTHIC SURVEILLANCE FISH LIVER DATA

National Status and Trends Program

Benthic Surveillance Fish Liver Data From Samples Collected in 1984

Explanation of tables:

Column headings are the same as those for APPENDIX D

Species symbols are;

wf = winter flounder

wpf = windowpane flounder

Ac = Atlantic croaker

sp = spot

bsb = barred sea bass ht = hornyhead turbot

dt = diamondhead turbot

wc = white croaker sf = starry flounder Es = English sole fs = flathead sole

All organic chemical data are derived from analyses of three separate composite samples with each composite consisting of ten livers.

All elemental concentrations are derived from analyses of individual livers. Ten individual livers were analyzed for fishes collected on the East and Gulf Coasts. Three individual livers were analyzed for West Coast fishes.

The coefficient of variation (c.v.%) column contains no entry if the mean value is not derived from at least two non-zero (n.d.) values.



Concentrations (ng/g dry weight) of total (non-DDT) chlorinated pesticides, tChIP, total DDT, tDDt, and total polychlorinated biphenyls, tPCB, in fish livers collected during 1984

Location		species		c.v.% 94	tDDt 46	c.v.% 65	tPCB 1016	c.v.% 67
Casco Bay ME	CSC	wf	72		77	33	1371	19
Merrimack River MA	MER	wf	89	22		58	2959	102
Salem Harbor MA	SAL	wf	621	116	583 827	16	10486	16
Boston Harbor MA	BOS	wţ	1078	13			2775	10
Buzzards Bay MA	BUZ	wf	40	29	56	6	2210	23
Narragansett Bay RI	NAR	wf	119	28	104	25	1577	23 18
E. Long Island Sound CT	ELI	wf	101	21	48	6		8
W. Long Island Sound NY	WLI	wf	282	14	105	28	3222	21
Delaware Bay DE	DEL	wpf	52	30	254	12	978	
L. Chesapeake Bay VA	LCB	Ac	169	69	140	10	1108	28
Pamlico Sound NC	PAM	Ac	52		60	_	60	
Charleston Harbor SC	CHS	Ac	54		62	6	179	E0
Sapelo Sound GA	SAP	sp	87	26	45	20	175	59
St. Johns River FL	SJR	sp	181	64	229	64	881	62
Charlotte Harbor FL	CHR	sp	40	29	24	38	nd	
Apalachicola Bay FL	APA	Ac	39	25	49	63	nd	
Mobile Bay AL	MOB	Ac	49	60	142	30	174	43
Round Island MS	ROU	sp	41		53	55	75	
Heron Bay MS	HER	Ac	29		10		25	
Mississippi River Delta LA	MRD	Ac	218	2	224	10	572	39
Barataria Bay LA	BAR	Ac	nd		nd		nd	
Galveston Bay TX	GAL	Ac	101	33	50	41	382	38
San Antonio Bay TX	SAB	Ac	35	45	28	74	54	29
Corpus Christi Bay TX	CCB	Ac	20		32		181	
Lower Lagunas Madre TX	LLM	Ac	29	42	62	39	182	48
San Diego Harbor CA	SDA	bsb	347	53	865	24	19722	12
San Diego Harbor CA	SDA	dt	415		731		8178	
San Diego Bay CA	SDF	ht	39		3867	9	1977	27
Dana Point CA	DAN	wc	47		1752	30	1086	28
Dana Point CA	DAN	bsb	80		1105	47	1862	14
Dana Point CA	DAN	ht	38		3180	36	766	0
San Pedro Canyon CA	SPC	ht	150	29	18660	55	7130	35
Seal Beach CA	SEA	wc	559	56	11821	11	7977	38
Seal Beach CA	SEA	ht	277		10627		5290	
Santa Monica Bay CA	SMB	ht	135	8	7462	45	5911	
Hunters Point CA	HUN	sf	641	3	1308	16	6990	39
Oakland Harbor CA	OAK	WC	420	45	1514	63	4772	22
Southampton Shoal CA	SHS	sf	93	•	1199	15	3733	30
San Pablo Bay CA	PAB	sf	250	17	1001	14	1191	6
Bodega Bay CA	BOD	wc	79		132	8	287	16
Bodega Bay CA	BOD		nd		1141		548	
Coos Bay OR	COO		nd		23	60	554	34
Columbia River OR	COL	sf	29	52	286	25	733	3
Nisqually Reach WA	NIS	Es	78	. 125	220	92	1746	84
Commencement Bay WA	COM		282	29	504	38	4313	22
Elliott Bay WA	ELL	Es	94	33	477	75	7631	30
Elliott Bay WA	ELL	fs	223		966		14695	
Nahku Bay AK	NAH	fs	58	52	212	33	602	7
Lutak Inlet AK	LUT	fs	55	23	234	53	664	56
בטנמת ווווסנ הוו		.5						

Concentrations (ug/g dry weight) of Antimony (Sb) Arsenic (As) and Cadmium (Cd) in fish livers collected in 1984

Location	Code	Species	Sb c.v.%	۸۵	O 77 07	0 -4	- 01
Casco Bay ME	CSC	wf	nd	AS 7.50	c.v.%	Cd	c.v.%
Merrimack River MA	MER	wf	nd	7.52 10.11	26.7	1.13	36.8
Salem Harbor MA	SAL	wf	nd		32.8	0.68	65.7
Boston Harbor MA	BOS	wf	nd	1.63 1.99	15.7	0.08	30.6
Buzzards Bay MA	BUZ	wf	0.01 162	20.44	50.5	0.14	62.3
Narragansett Bay RI	NAR	wf	nd	24.64	62.8 88.7	0.39	76.7
E. Long Island Sound CT	ELI	wf	nd	10.77	129.1	0.53	84.2
W. Long Island Sound NY	WLI	wf	nd	5.38	97.1	2.02 1.92	137.3
Delaware Bay DE	DEL	wpf	nd	6.29	138.3	0.15	24.1
L.Chesapeake Bay VA	LÇB	Ac	nd	9.43	21.3	0.13	61.7 34.7
Pamlico Sound NC	PAM	Ac	nd	4.61	29.8	0.49	34.7 150.6
Charleston Harbor SC	CHS	Ac	nd	7.73	12	0.06	46
Sapelo Sound GA	SAP	sp	nd	6.43	19.7	0.12	76.5
St. Johns River FL	SJR	sp	nd	1.7	50	0.15	76.5 34.2
Charlotte Harbor FL	CHR	sp	nd	6.57	8.4	0.53	31.2
Apalachicola Bay FI	APA	Ác	nd	6.45	34.6	0.48	32.3
Mobile Bay AL	MOB	Ac	nd	5.48	20.4	0.15	50 50
Round Island MS	ROU	sp	nd	8.16	28	0.31	19.7
Heron Bay MS	HER	Ac	nd	9.05	93.5	1.83	57.1
Mississippi River Delta LA	MRD	Ac	nd	3.63	25	0.7	55.1
Barataria Bay LA	BAR	Ac	nd	2.99	57.5	0.13	42
Galveston Bay TX	GAL	Ac	nd	4.86	25.6	0.1	27.4
San Antonio Bay TX	SAB	Ac	nd	3.59	30.7	0.23	38.5
Corpus Christi Bay TX	CCB	Ac	nd	10.52	32.1	0.27	58.8
Lower Laguna Madre TX	LLM	Ac	nd	8.11	18.8	0.29	57.3
San Diego Harbor CA	SDA	bsb	nd	5.4	66.8	0.55	45.1
San Diego Bay CA	SDF	ht	0.04	8.73	86.4	5.22	79.7
Dana Point CA Dana Point CA	DAN	wc	0.04	16.0	62.0	4.11	53.0
Dana Point CA Dana Point CA	DAN	bsb	0.45 36.4	6.7	83.6	8.6	68.5
	DAN	ht	0.50 61.8	27.3	92.2	4.1	37.6
San Pedro Canyon CA Seal Beach CA	SPC	ht	0.32 89.9	1.9	73.8	0.81	51.6
Santa Monica Bay CA	SEA	wc	nd	12.63	44	2.42	48.6
Hunters Point CA	SMB	ht	0.29 48.2	11.33	13.4	2.12	12.7
Oakland Harbor CA	HUN	sf	0.25 71.6	0.6	92.4	5.75	108.2
Southampton Shoal CA	OAK	wc	nd	11.96	36.7	1.49	49.6
San Pablo Bay CA	SHS	sf -f	0.52 75.4	2.02	100.3	19.56	86.6
Bodega Bay OR	PAB	sf	0.3 30.6	1.31	38	0.56	18.9
Coos Bay OR	BOD COO	sf	0.56 13.5	1.56	131.4	2.19	93.4
Columbia River OR	COL	sf	nd	32.66	60.4	0.96	49.6
Nisqually Reach WA	NIS	sf F-	0.22 113.8	12.33	12.3	5.23	44.3
Commencement Bay WA	COM	Es	0.6 22.5	18	14.6	10.14	67.4
Elliott Bay WA	ELL	Es Es	0.6 41.7	4.9	33.7	1.39	35.3
Nahku Bay AK	NAH	⊏S fs	0.55 20.8	9.63	74.7	1.52	87.3
Lutak Inlet AK	LUT	is fs	0.62 11.6	29.33	34.1	1.26	55.9
	LU I	19	0.61 35.3	29.33	96.9	2.21	92.9

Concentrations (ug/g dry weight) of Chromium (Cr), Copper (Cu), and Lead (Pb) in fish livers collected in 1984

Casco Bay ME Merrimack River MA Merrimack River MA SAL Merrimack River MA SAL Merrimack River MA SAL Boston Harbor MA SAL Wf 0.06 89.4 56.02 57.4 0.56 56.7 30.52 34.1 Boston Harbor MA BOS Wf 0.26 85.5 15.1 49.4 0.62 41.8 Buzzards Bay MA Buz Wf 0.16 168.2 15.69 66.1 NAR Merrimack River MA SAL Wf 0.16 168.2 15.69 66.1 NAR Wf 0.08 159.4 22.46 75.8 1.02 50.7 E. Long Island Sound CT W. Long Island Sound NY Delaware Bay DE DEL Wpf 0.05 316.2 17.8 28.4 0.18 152.9 L. Chesapeake Bay VA LCB AC O.9 183.7 22.23 44.5 0.21 244 Pamilico Sound NC CHAS AC O.05 79.5 23.75 36.9 0.03 94.2 Sapelo Sound GA SAP SP SP SAP SAP SP SAP SP SAP SP SAP SP SAP SP SAP SP SAP SP SAP SP SAP SP SAP SP SAP SP SAP SP SAP SP SAP SP SAP SP SAP SAP SP SAP SP SAP SAP SP SAP SP SAP SAP SP SAP SAP SAP SP SAP SAP SAP SAP SAP SAP SAP SAP SAP SAP	Location	Code S	pecies	Cr c.v.	% Cu	c.v.%		v.%
Merrimack River MA Salem Harbor MA Salem Harbor MA Salem Harbor MA Salem Harbor MA BOS Wf 0.26 85.5 15.1 49.4 0.62 41.8 Buzzards Bay MA BUZ Wf 0.16 168.2 15.89 66.1 1.15 107.1 Narragansett Bay RI R. Long Island Sound CT W. Long Island Sound NY Delaware Bay DE L. Chesapeake Bay VA Pamilico Sound NC PAM Ac Charleston Harbor SC Sapelo Sound GA Salem				0.23 129.9	68.98	51.9	7.39	
Salem Harbor MA Boston Harbor MA Boston Harbor MA Boston Harbor MA Boston Harbor MA Boston Harbor MA Boston Harbor MA Buzzards Bay MA BuZ wf 0.26 85.5 15.1 49.4 0.62 41.8 Buzzards Bay MA BuZ wf 0.16 168.2 15.69 66.1 1.15 107.1 Narragansett Bay RI NAR wf 0.08 159.4 22.46 75.8 1.02 50.7 E. Long Island Sound CT W. Long Island Sound NY WLI wf 0.42 54.8 29.7 42.4 1.39 46.9 Delaware Bay DE L. Chesapeake Bay VA Lore Loesapeake Bay VA Lore Loesapeake Bay VA Lore Loesapeake Bay VA Lore Loesapeake Bay VA Lore Loesapeake Bay VA Lore Loesapeake Bay VA Lore Loesapeake Bay VA Charleston Harbor SC CHS Ac 0.05 79.5 23.75 36.9 0.03 94.2 Sapelo Sound GA SAP sp 0.05 79.5 23.75 36.9 0.03 94.2 Sapelo Sound GA SAP Sp 0.02 74.3 9.82 38.7 0.22 41.1 Charlotte Harbor FL CHR Sp 0.02 74.3 9.82 38.7 0.22 41.1 Charlotte Harbor FL CHR Sp 0.02 84.7 23.23 46.1 0.09 33.8 Charlotte Harbor FL CHR Sp 0.02 84.7 23.23 46.1 0.09 33.8 Charlotte Harbor FL CHR Sp 0.02 84.7 23.23 46.1 0.09 33.8 Charlotte Harbor FL CHR Sp 0.02 84.7 23.23 46.1 0.09 33.8 Charlotte Harbor FL CHR Sp 0.02 84.7 23.23 46.1 0.09 33.8 Charlotte Harbor FL CHR Sp 0.02 84.7 23.23 46.1 0.09 33.8 Charlotte Harbor FL CHR Sp 0.02 84.7 23.23 46.1 0.09 33.8 Charlotte Harbor FL CHR Sp 0.02 84.7 23.23 46.1 0.09 33.8 Charlotte Harbor FL CHR Sp 0.02 84.7 23.23 46.1 0.09 33.8 Charlotte Harbor FL CHR Sp 0.03 122.6 19.11 34.5 0.09 57.5 Chron Bay MS HER Ac 0.38 60 30.76 108.5 0.09 62.4 Mississippi River Delta LA MRD Ac 0.38 60 30.76 108.5 0.09 62.4 Mississippi River Delta LA BAR Ac 0.04 55.9 16.12 34.1 0.16 201.5 Corpus Christi Bay TX GAL Corpus Christi Bay TX GAL Corpus Christi Bay TX CR SpA Dana Point CA DAN bsb 0.31 39.3 7.0 28.3 144.7 0.06 71.7 Corpus Christi Bay TX CR Dana Point CA DAN bsb 0.31 39.3 7.0 28.3 144.7 0.07 11.3 Dana Point CA DAN bsb 0.31 39.3 7.0 28.3 144.7 0.07 11.3 Dana Point CA Dana Point CA DAN bsb 0.31 39.3 7.0 28.3 144.7 0.07 11.3 Dana Point CA Dana Point CA DAN bsb 0.31 39.3 7.0 28.3 144.7 0.07 11.3 Dana Point CA Dana Point CA DAN bsb 0.31 39.3 7.0 28.3 14.7 0.07 11.3 Dana						57.4	0.56	56.7
Boston Harbor MA BUZ wf 0.16 168.2 15.69 68.1 1.15 107.1 Narragansett Bay MA Narragansett Bay RI Long Island Sound CT W. Long Island Sound NY Delaware Bay DE DEL Wf 0.15 21.2 33.9 60.3 0.61 50.7 W. Long Island Sound NY Delaware Bay DE DEL Wf 0.42 54.8 29.7 42.4 1.39 46.9 Delaware Bay DE Lohesapeake Bay VA Delaware Bay DE							0.52	34.1
Buzzards Bay MA Narragansett Bay RI E. Long Island Sound CT ELI Wf 0.11 212 33.9 60.3 0.611 50 WL Long Island Sound NY Delaware Bay DE L. Chesapeake Bay VA Pamilico Sound NC Charleston Harbor SC CHS Sapelo Sound GA SAP Sp 0.05 79.5 St Johns River FL CHR Sp 0.02 74.3 St Johns River FL CHR Sp 0.02 44.7 San Diego Harbor CA San Diego Bay CA Dana Point CA Dana Point CA Dana Point CA Dana Point CA Dana Point CA Dana Point CA San Diego Bay CA SAN Si Sy Si Sul Ada San Diego Bay CA SAN SH SH SH Si Sul Ada Si Si Sul Ada Si Si Sul Ada Si Si Sul Ada Si Si Sul Ada Si Si Sul Ada Si Si Sul Ada Si Si Sul Ada Si Si Sul Ada Si Si Sul Ada Si Si Sul Ada Si Si Sul Ada Si Si Sul Ada Si Si Sul Ada Si Si Sul Ada Si Si Sul Ada Si Si Si Sul Ada Si Si Si Sul Ada Si Si Si Sul Ada Si Si Sul Ada Si Si Si Si Sul Ada Si Si Si Si Sul Ada Si Si Si Sul Ada Si Si Si Sul Ada Si Si Si Si Si Si Si Si Si Si Si Si Si S								41.8
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Delaware Bay DE DEL Wpf 0.05 316.2 17.8 28.4 0.18 152.9	E. Long Island Sound Ci							
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Heron Bay MS HER Ac 0.38 60 30.76 108.5 0.09 62.4	Round Island MS	ROU	sp					
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Galveston Bay TX GAL Ac 0.24 62.2 15.77 31.3 0.18 47.5 San Antonio Bay TX SAB Ac 0.05 52.2 19.62 95.1 0.06 119.3 Corpus Christi Bay TX CCB Ac 0.02 112.9 48.37 44.8 0.09 74.7 Lower Laguna Madre TX LLM Ac 0.03 130.2 18.68 37.7 0.07 41.5 San Diego Harbor CA SDA bsb 0.18 68.7 6.08 24.9 0.09 128.1 San Diego Bay CA SDF ht 0.52 35.3 21.73 18.7 0.17 139.6 Dana Point CA DAN wc 0.32 27.9 185 71.1 nd Dana Point CA DAN bsb 0.31 39.3 7.0 28.3 0.11 17.5 Dana Point CA DAN ht 0.88 103.5 31.7 8.5 0.37 36.5 <		BAR	Ac	0.08 57.6				
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San Diego Bay CA SDF ht 0.52 35.3 21.73 18.7 0.17 139.6 Dana Point CA DAN wc 0.32 27.9 185 71.1 nd Dana Point CA DAN bsb 0.31 39.3 7.0 28.3 0.11 17.5 Dana Point CA DAN ht 0.88 103.5 31.7 8.5 0.37 36.5 San Pedro Canyon CA SPC ht 0.35 47.7 79.56 70.2 nd Seal Beach CA SEA wc 0.13 89.4 45.2 10 0.05 Santa Monica Bay CA SMB ht 0.3 41.2 27.03 36.7 0.12 21.5 Hunters Point CA HUN sf 0.09 42.8 83.96 32.2 0.27 55.3 Oakland Harbor CA OAK wc 0.18 34.8 98.86 58.9 0.27 12.6 Southampton Shoal CA SHS sf<	San Diego Harbor CA			0.18 68.	7 6.08	24.9		
Dana Point CA DAN wc 0.32 27.9 185 71.1 nd Dana Point CA DAN bsb 0.31 39.3 7.0 28.3 0.11 17.5 Dana Point CA DAN ht 0.88 103.5 31.7 8.5 0.37 36.5 San Pedro Canyon CA SPC ht 0.35 47.7 79.56 70.2 nd Seal Beach CA SEA wc 0.13 89.4 45.2 10 0.05 Santa Monica Bay CA SMB ht 0.3 41.2 27.03 36.7 0.12 21.5 Hunters Point CA HUN sf 0.09 42.8 83.96 32.2 0.27 55.3 Oakland Harbor CA OAK wc 0.18 34.8 98.86 58.9 0.27 12.6 Southampton Shoal CA SHS sf 0.24 78.4 117.83 33 0.34 47 San Pablo Bay CA PAB sf					3 21.73	18.7	0.17	139.6
Dana Point CA DAN bsb 0.31 39.3 7.0 28.3 0.11 17.5 Dana Point CA DAN ht 0.88 103.5 31.7 8.5 0.37 36.5 San Pedro Canyon CA SPC ht 0.35 47.7 79.56 70.2 nd Seal Beach CA SEA wc 0.13 89.4 45.2 10 0.05 Santa Monica Bay CA SMB ht 0.3 41.2 27.03 36.7 0.12 21.5 Hunters Point CA SMB ht 0.3 41.2 27.03 36.7 0.12 21.5 Hunters Point CA HUN sf 0.09 42.8 83.96 32.2 0.27 55.3 Oakland Harbor CA OAK wc 0.18 34.8 98.86 58.9 0.27 12.6 Southampton Shoal CA SHS sf 0.24 78.4 117.83 33 0.34 47 San Pablo Bay CA BOD sf						71.1	nd	
Dana Point CA DAN ht 0.88 103.5 31.7 8.5 0.37 36.5 San Pedro Canyon CA SPC ht 0.35 47.7 79.56 70.2 nd Seal Beach CA SEA wc 0.13 89.4 45.2 10 0.05 Santa Monica Bay CA SMB ht 0.3 41.2 27.03 36.7 0.12 21.5 Hunters Point CA HUN sf 0.09 42.8 83.96 32.2 0.27 55.3 Oakland Harbor CA OAK wc 0.18 34.8 98.86 58.9 0.27 12.6 Southampton Shoal CA SHS sf 0.24 78.4 117.83 33 0.34 47 47 San Pablo Bay CA PAB sf 0.09 87.9 76.13 28.5 0.1 31.1 28.5 0.1 31.1 10.27 Bodega Bay CA BOD sf 0.11 56 70.05 77.1 0.12 102.7 10.27 Coos Bay OR COO sf 1.4 41.6 77.76 48.6 0.61 58.5 0.61 58.5 Columbia River OR COL sf 0.89 66.3 39.15 95.5 0.19 10.5 0.19 10.5 Nisqually Reach WA NIS						28.3	0.11	17.5
San Pedro Canyon CA SPC ht 0.35 47.7 79.56 70.2 nd Seal Beach CA SEA WC 0.13 89.4 45.2 10 0.05 Santa Monica Bay CA SMB ht 0.3 41.2 27.03 36.7 0.12 21.5 Hunters Point CA HUN sf 0.09 42.8 83.96 32.2 0.27 55.3 Oakland Harbor CA OAK WC 0.18 34.8 98.86 58.9 0.27 12.6 Southampton Shoal CA SHS sf 0.24 78.4 117.83 33 0.34 47 San Pablo Bay CA PAB sf 0.09 87.9 76.13 28.5 0.1 31.1 Bodega Bay CA BOD sf 0.11 56 70.05 77.1 0.12 102.7 Coos Bay OR COO sf 1.4 41.6 77.76 48.6 0.61 58.5 Columbia River OR C						8.5	0.37	36.5
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Oakland Harbor CA OAK WC 0.18 34.8 98.86 58.9 0.27 12.6 Southampton Shoal CA SHS sf 0.24 78.4 117.83 33 0.34 47 San Pablo Bay CA PAB sf 0.09 87.9 76.13 28.5 0.1 31.1 Bodega Bay CA BOD sf 0.11 56 70.05 77.1 0.12 102.7 Coos Bay OR COO sf 1.4 41.6 77.76 48.6 0.61 58.5 Columbia River OR COL sf 0.89 66.3 39.15 95.5 0.19 10.5 Nisqually Reach WA NIS Es 0.7 71.3 106.16 8.2 0.49 41.9 Commencement Bay WA ELL Es 0.62 23.7 53.8 100.4 2.34 91.1 Nahku Bay AK NAH fs 0.23 47 13.7 27.6 0.25 33.5								
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Elliott Bay WA ELL Es 0.62 23.7 53.8 100.4 2.34 91.1 Nahku Bay AK NAH fs 0.23 47 13.7 27.6 0.25 33.5	Nisqually Reach WA							
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Concentrations (ug/g dry weight) of Mercury (Hg), Nickel (NI) , and Selenium (Se) in fish livers collected in 1984

Location		Species	Hg	c.v.%	Ni	c.v.%	Se	c.v.%
Casco Bay ME	CSC	wf	0.26	81.3	0.52	177.9	7.72	16.9
Merrimack River MA	MER	wf	0.26	28.4	0.35	130.3	6.73	29.3
Salem Harbor MA	SAL	wf	0.09	55.8	0.37	55.6	2.8	34.7
Boston Harbor MA	BOS	wf	0.11	45	0.28	30.1	3.01	36.6
Buzzards Bay MA	BUZ	wf	0.2	69.9	0.29	121.6	4.45	42.2
Narragansett Bay RI	NAR	wf	0.29	32.5	0.22	156	4.25	51.8
E. Long Island Sound CT	ELI	wf	0.41	36.1	0.88	106.1	8.77	19.3
W. Long Island Sound NY	WLI	wf	0.51	34.2	2.81	55.7	10.28	21.2
Delaware Bay DE	DEL	wpf	0.45	20.7	1.09	147.7	7.22	21.3
L. Chesapeake Bay VA	LCB	Ac	0.45	41.3	0.85	164.1	13.9	18.4
Pamlico Sound NC	PAM	Ac	0.07	49.9	0.46	74.6	15.43	22.4
Charleston Harbor SC	CHS	Ac	0.3	67.9	0.17	84.4	17.8	18.7
Sapelo Island GA	SAP	sp	0.09	32.6	0.2	55.9	10.96	12.3
St. Johns River FL	SJR	sp	0.12	46.6	0.09	123.3	7.32	46.7
Charlotte Harbor FL	CHR	sp	0.41	21.9	0.23	31.3	8.38	10.7
Apalachicola Bay FL	APA	Ac	0.49	23	0.43	45.6	28.4	31.7
Mobile Bay AL	MOB	Ac	0.23	34	0.73	31.3	18.71	13.2
Round Island MS	ROU	sp	0.28	26.1	0.3	25.4	13.01	20.8
Heron Bay MS	HER	Ac	0.32	85.4	0.47	72.1	21.01	22
Mississippi River Delta LA	MRD	Ac	0.13	51.4	1.14	36.2	23.83	18.5
Barataria Bay LA	BAR	Ac	0.12	65.4	0.38	61.2	9.85	27.4
Galveston Bay TX	GAL	Ac	0.15	86.8	0.85	48.1	20.42	21.4
San Antonio Bay TX	SAB	Ac	0.07	51.6	0.45	56.3	18.38	15.6
Corpus Christi Bay TX	CCB	Ac	0.77	50.9	0.13	73	34.86	23.4
Lower Laguna Madre TX	LLM	Ac	0.13	25.5	0.32	63.2	15.59	43.2
San Diego Harbor CA	SDA	bsb	1.67	30.7	1.86	38	21.26	52.2
San Diego Bay CA	SDF	ht	0.52	79.9	1.17	44.9	1.17	44.1
Dana Poinț CA	DAN	WC	2.42	59.1	1.2	72.2	28.4	52.9
Dana Point CA	DAN	bsb	6.20	72.2	0.05		21.8	74.2
Dana Point CA	Dan	ht	0.39	62.2	1.5	144.0	8.7	42.2
San Pedro Canyon CA	SPC	ht	0.31	107.5	0.47	58.7	1.5	23.8
Seal Beach CA	SEA	WC	0.41	25.6	0.72	26.7	21.02	59.8
Santa Monica Bay CA	SMB	ht	0.28	86.8	nd		6.96	48.2
Hunters Point CA	HUN	sf	0.56	37.5	0.28	64.5	3.63	26.6
Oakland Harbor CA	OAK	wc	0.95	55.2	0.7	20.9	8.68	76.9
Southampton Shoal CA	SHS	sf	5.83	135.9	1.33		36.2	28.3
San Pablo Bay CA	PAB	sf	nd		0.04		4.33	14.3
Bodega Bay Ča	BOD	sf	0.25	92.2	0.15		6.76	102.2
Coos Bay OR	COO	sf	0.11		0.88	16.4	11.32	38.6
Columbia River OR	COL	sf	0.12	92.7	nd		4.47	26.3
Nisqually Reach WA	NIS	Es	0.21	43.5	1.7	38.5	6.98	25.2
Commencement Bay WA	COM	Es	0.13	93.2	1.17	39.6	19.16	25.7
Elliott Bay WA	ELL	Es	0.09	94.9	0.38	54.7	8.81	8.4
Nahku Bay AK	NAH	fs	nd		0.65	54.9	11.53	36.3
Lutak Inlet AK	LUT	fs	0.04		0.12		14.36	19.4

Concentrations (ug/g dry weight) of Silver (Ag), Thallium (TI), and Tin (Sn) in fish livers collected in 1984

Location	Code	Species	Ag c.v.%	TI c.v.	.%	Sn	c.v.%
Casco Bay ME	CSC	wf	1.58 55.8	nd		0.81	148.2
Merrimack River MA	MER	· wf	1.25 55.8	nd		0.61	195.2
Salem Harbor MA	SAL	wf	0.51 104.2	nd		0.12	134.4
Boston Harbor MA	BOS	wf	0.7 52.9	nd		0.08	162.9
Buzzards Bay MA	BUZ	wf	0.35 86.2	nd		0.23	114.2
Narragansett Bay RI	NAR	wf	0.31 94.3	nd		0.42	198
E. Long Island Sound CT	ELI	wf	.74 111.8	nd		0.93	117
W. Long Island Sound NY	WLI	wf	0.59 30.3	nd		2.09	56.8
Delaware Bay DE	DEL	wpf	0.22 70.2		316.2	0.44	169.4
L. Chesapeake Bay VA	LCB	Ac	0.18 48.2	nd		0.83	119.6
Pamlico Sound NC	PAM	Ac	0.1 85.2	nd		0.46	174.9
Charleston Harbor SC	CHS	Ac	0.14 75.7	nd		0.4	24.8
Sapelo Island GA	SAP	sp	0.02 53.9	nd		0.19	36.5
St. Johns River FL	SJR	sp	0.02 88	nd		0.26	123.1
Charlotte Harbor FL	CHR	sp	0.17 71.9	nd		0.49	60.4
Apalachicola Bay FL	APA	Ac	0.12 85.5	nd		0.44	120
Mobile Bay AL	MOB		0.1 57.3	nd		0.51	89.3
Round Island MS	ROU	sp	0.15 69.8	nd		0.39	68.8
Heron Bay MS	HER	Ac	0.26 156.2	nd		0.6	120.6
Mississippi River Delta LA			0.02 61.6	nd		1.14	44.2
Barataria Bay LA	BAR	Ac	0.04 132.8	nd		0.29	99.3
Galveston Bay TX	GAL	Ac	0.03 72.6	nd		1.21	67.2
San Antonio Bay TX	SAB	Ac	0.08 118.4	nd		0.4	115.3
Corpus Christi Bay TX	CCB	Ac	0.16 56.7	nd		0.99	124.5
Lower Laguna Madre TX	LLM	Ac	0.04 54.8	nd		0.62	67.9
San Diego Harbor CA	SDA	bsb	0.12 24.1	nd		1.26	96.6
San Diego Bay CA	SDF	ht	0.64 61.6	nd		0.42	
Dana Point CA	DAN	wc	2.4 77.2	nd		0.15	15.1
Dana Point CA	DAN	bsb	0.06 57.1	0.001		0.75	37.5
Dana Point CA	DAN	ht	0.67 9.5	0.007	31.2	nd	
San Pedro Canyon CA	SPC	ht	1.67 70	nd		0.05	
Seal Beach CA	SEA	WC	0.71 79.3	0.01	60	0.86	87.1
Santa Monica Bay CA	SMB		2.07 16.7	nd		0.31	90.6
Hunters Point CA	HUN	_	0.64 87.9	0.01	42.8	0.94	51.1
Oakland Harbor CA	OAK		0.9 44	nd		1.1	112.6
Southamptonb Shoal CA			0.27 45.5	0.01	68.6	0.89	130.3
San Pablo Bay CA	PAB		0.32 22.3	0.01	16.6	0.97	55.5
Bodega Bay CA	BOD		0.43 74.3	0.01	39.3	0	V U · U
Coos Bay CA	COO		0.65 46.9	0.03	67.4	7.33	66.2
Columbia River OR	COL	_	0.22 73.4		116.9	0.21	
Nisqually Reach WA	NIS	Es	0.9 17.8	nd		0.15	
Commencement Bay WA			0.4 65.8	nd		0.63	72.5
Elliott Bay WA	ELL	Es	0.54 55.2	nd		4.25	96.4
Nahku Bay AK	NAH		0.12 49.2	0.01	10.8	0.72	94
Lutak Inlet AK	LUT	fs	0.09 10.7	0.01	6	21.6	0
בטנמו ווווסנ אוו	201	10	0.00 10.7	0.01	~		•

Concentrations (ug/g dry weight) of Zinc (Zn) in fish livers collected in 1984

Location	Code	Species	Zn	c.v.%
Casco Bay ME	CSC	wf	184	16
Merrimack River MA	MER	wf	161	38.7
Salem Harbor MA	SAL	wf	81	25.5
Boston Harbor MA	BOS	wf	86	34.4
Buzzards Bay MA	BUZ	wf	133	29.4
Narragansett Bay RI	NAR	wf	130	18.1
E. Long Island Sound CT	ELI	wf	170	20.5
W. Long Island Sound NY	WLI	wf	128	42.7
Delaware Bay DE	DEL	wpf	106	24.2
L. Chesapeake Bay VA	LCB	Ac	145	16.8
Pamlico Sound NC	PAM	Ac	104	9.9
Charleston Harbor SC	CHS	Ac	115	17.7
Sapelo Island GA	SAP	sp	92	6.6
St. Johns River FL	SJR	sp sp	72	27.7
Charlotte Harbor FL	CHR		94	15.1
Apalachicola Bay FL	APA	sp Ac	131	
Mobile Bay AL	MOB	Ac	123	18.4 12.8
Round Island MS	ROU			13.9
Heron Bay MS	HER	sp	101	
Mississippi River Delta LA	MRD	Ac	104	42.7
	BAR	Ac Ac	98	14.5
Barataria Bay LA	GAL	AC Ac	104	33.6
Galveston Bay TX San Antonio Bay TX	-		112	11.5
	SAB	Ac	115	18.3
Corpus Christi Bay TX	CCB	Ac	129	11.4
Lower Laguna Madre TX	LLM	Ac	105	16
San Diego Harbor CA	SDA SDF	bsb	71	21
San Diego Bay CA		ht	281	29.1
Dana Point CA	DAN	WC	158	37.3
Dana Point CA	DAN	bsb	111	31.6
Dana Point CA	DAN	ht	288	8.7
San Pedro Canyon CA Seal Beach CA	SPC	ht	179	46.1
	SEA	WC	99	13.4
Santa Monica Bay CA Hunters Point CA	SMB	ht	167	21.7
	HUN	sf	129	15.5
Oakland Harbor CA	OAK	wc	73	15.8
Southampton Shoal CA	SHS	sf	166	38.5
San Pablo Bay CA	PAB	sf	84	23.8
Bodega Bay CA	BOD	sf -f	153	35.7
Coos Bay OR	000	sf	185	16.3
Columbia River OR	COL	Sf Co	159	36.8
Nisqually Reach WA	NIS	Es	189	11.2
Commencement Bay WA	COM	Es	115	13.7
Elliott Bay WA	ELL	Es	137	22.5
Nahku Bay AK	NAH	fs	100	28
Lutak Inlet AK	LUT	fs	112	4.4